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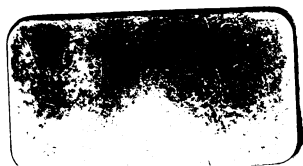
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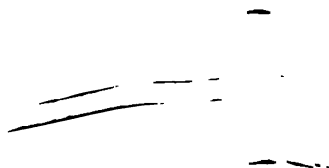


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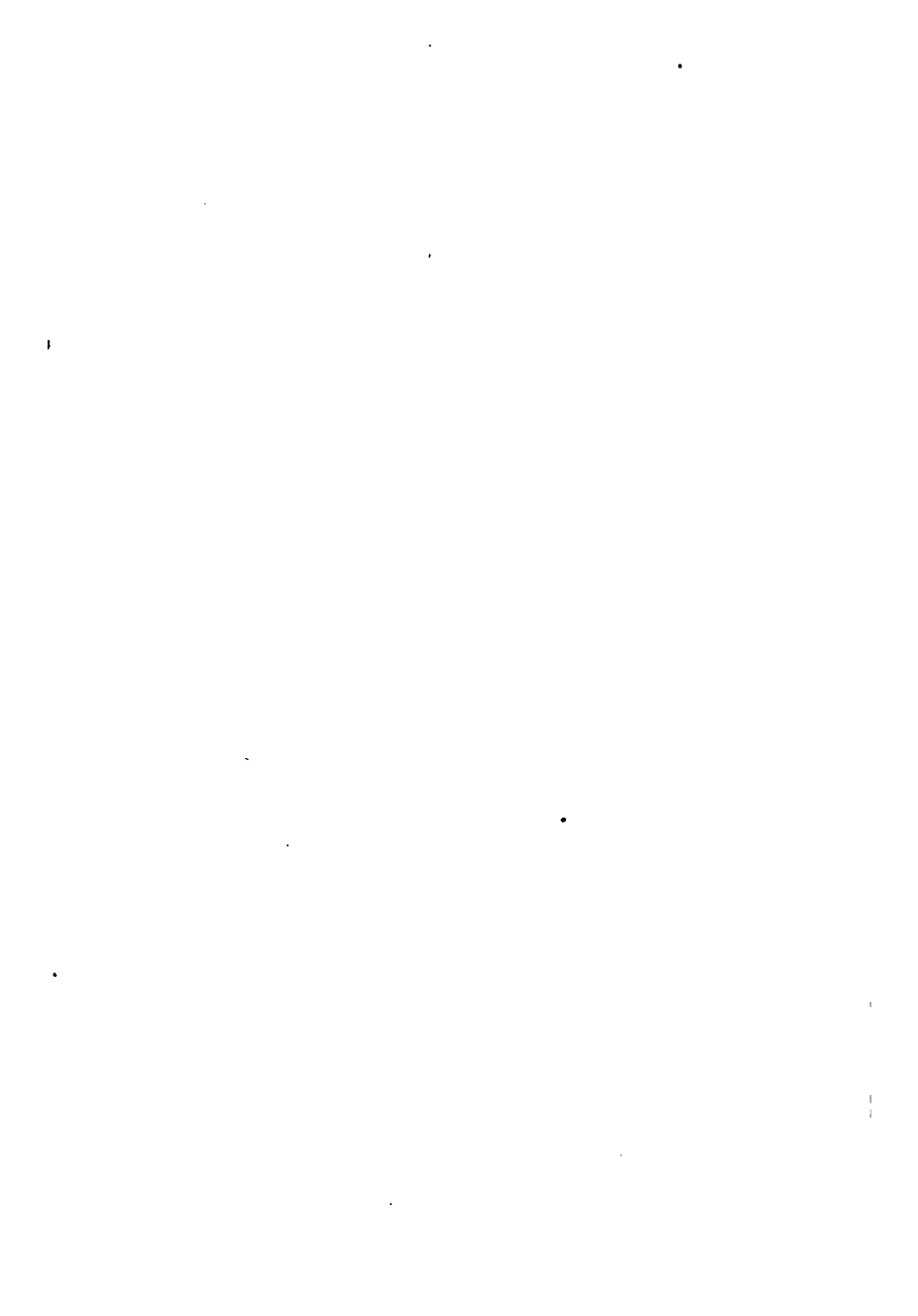


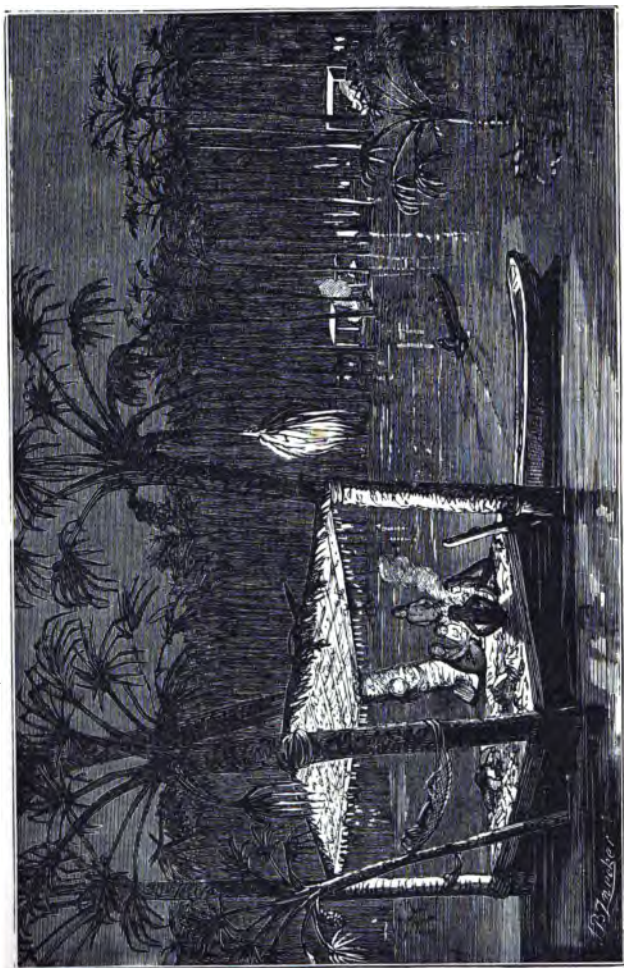


ALEXANDER VON HUMBOLDT.









DWELLINGS OF THE GUARANIS

THE STORY  
OF  
THE LIFE AND TRAVELS  
OF  
ALEXANDER VON HUMBOLDT.

---

" Pierce the dark soil, and as they pierce and pass,  
Make bare the secrets of the Earth's deep heart ;  
Infinite mine of adamant and gold,  
Valueless stones and unimagined gems,  
And caverns on crystalline columns poised,  
With vegetable silver overspread ;  
Wells of unfathomed fire, and water-springs  
Whence the great Sea, even as a child, is fed."

SHELLEY.



LONDON: THOMAS NELSON AND SONS.  
EDINBURGH AND NEW YORK.

1879.

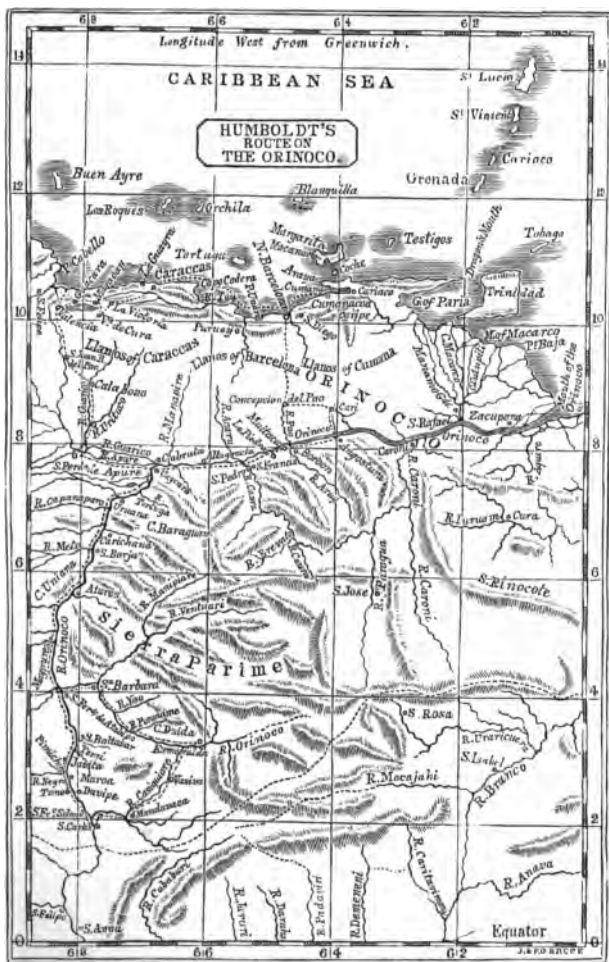
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# ALEXANDER VON HUMBOLDT

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## CHAPTER I.

### GENERAL SKETCH OF HUMBOLDT'S LIFE.



Two a chamberlain of Frederick, King of Prussia, were born, in the third quarter of the eighteenth century, two sons, both of whom were destined to make their mark in the world, and to render no small service to the cause of human enlightenment and human progress. These were Karl Wilhelm and Friedrich Heinrich Alexander von Humboldt; the former born at Potsdam on the 22nd of June 1767, and the latter at Berlin on the 14th of September 1769. Wilhelm lived to acquire a distinguished name in Germany; Alexander's reputation is as wide as the civilized world. Wilhelm confined his researches to the

realms of Art and Literature ; Alexander devoted himself to the study of Nature. It is to the life and labours of the latter that the following pages will be limited ; but it seems fitting to prefix a brief memoir of the elder brother. His friend Schiller told him, with much justice, that his mind was too critical and reflective to permit him to produce any original works of art in literature or otherwise ; and, as a matter of fact, his chief intellectual acquirements were in the department of philology. But it is not to these, nor to his general culture, that he owed the esteem and admiration with which he was regarded by some of the best men of his age. These were due to his political conduct. At a time and in a country where and when the principles of liberty were held in disrepute, he advocated them with equal earnestness and wisdom. Hence it was certain that he would never attain to greatness in the sense in which greatness was understood at the Court of Berlin ; but he secured for himself the confidence of his fellow-countrymen, and the love and respect of all whose good opinion he most valued.

The two Humboldts lost their father when the one was twelve and the other ten years old ; but their mother was a woman of considerable cultiva

tion and fine capacity; and as the family fortunes were good, they enjoyed every educational advantage. Wilhelm was trained at Frankfort-on-the-Oder and at Göttingen, where he eagerly studied antiquity, mental philosophy as taught by Kant, and æsthetics, while more particularly preparing himself for the legal profession. As soon as his university course was completed, he set out on his travels, and visited the principal towns and scenes of Germany, France, and Switzerland. On his return he was raised to the rank of Counsellor of Legation, and a public career was opened up to him under the most favourable auspices. He did not evince any inclination, however, for active life; and having married in 1791, he resided for some years, in the enjoyment of lettered ease, on his wife's Thuringian estate. Afterwards he removed to Jena, where he formed an intimate friendship with the poet Schiller, and entered with great ardour on literary and scientific pursuits.

From 1797 to 1799 he was absent in France and Spain; and in 1801 he accepted the post of Prussian Resident at Rome; a post which was admirably adapted to his qualifications and his tastes. While carefully attending to his official duties, he drew

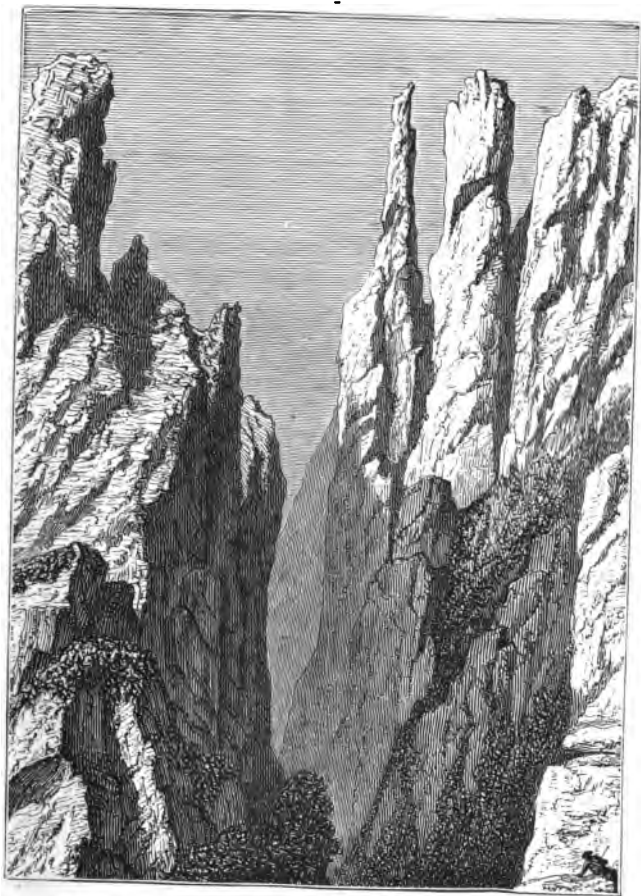
around him a brilliant circle of artists and men of science; and interested himself greatly in the antiquities of the imperial city. From Rome he returned to Berlin, where he was appointed chief Minister of Public Instruction. In this capacity he founded the University of Berlin, and greatly improved and broadened the national system of education. In 1810 he was despatched to Vienna as Minister-Plenipotentiary, and he took an energetic part in forming those European combinations which led to the overthrow of Napoleon. At the Congress of Vienna he was present as the representative of Prussia, and he signed that Treaty of Chatillon which marked the first stage of the French Emperor's downfall; justly characterized as "one of the most remarkable diplomatic acts of modern times, presenting an impassable barrier to the ambition and efforts of France." \*

\* Sir Archibald Alison says: "His situation at Vienna, constantly watched as he was by the agents of Napoleon, was one of uncommon delicacy and difficulty; but he discharged its duties with equal judgment and address. When the War of Independence, in 1813, broke out in the north of Germany, he was of infinite use at the Imperial Court in supporting the views of Prince Hardenberg, the Austrian minister, and overcoming the hesitation of the Cabinet of Vienna, produced by the advantages of the French family alliance on the one hand, and the ardent feelings of German nationality in the empire on the other. His diplomatic situation at Vienna led to his being appointed the chief diplomatist on the part of Prussia in the Congress of Prague; he subsequently took part in the Congress of Chatillon; signed, with Hardenberg, the Treaty of Paris; and was actively employed in the Congress of Vienna."—*History of Europe*, x. 333.

Wilhelm von Humboldt was before all a patriot ; and while actively engaged in opposing the aggression of France, he did not lose sight of the fact that Prussia had been governed as an absolute monarchy. He advocated the cause of popular representation, and it was largely through his influence that, in 1813, the King of Prussia conceded to his people a liberal constitution. When the fall of Napoleon was finally accomplished, the King showed no desire to fulfil the promise he had given ; and Humboldt immediately resigned all his employments. He retired to his private estate at Tegel, where he laid out an extensive series of pleasure-grounds, and formed a splendid collection of works of art by the greatest sculptors. His leisure was spent in philological and literary studies, until, in 1835, in the sixty-ninth year of his age, he died.

Miss Martineau draws a vivid contrast between the two brothers in their later fortunes. William, as she remarks, incurred the displeasure of the King by his liberal tendencies ; Alexander retained favour and distinction at Court to the end. Patronage was showered on the successful man of science, without too rigid an inquiry on the one hand, or too full an explanation on the other, in regard to his views on

the principles and practice of government. It is very possible that Alexander, absorbed in the investigation of Nature's secrets, troubled himself very little about either. While William retired to explore the roots of words and the genealogy of languages, and to compose the one hundred sonnets which were found in manuscript after his death, Alexander was displaying more stars on his coat, and receiving more honours on his head. But, as Miss Martineau observes, there could never be any rational objection to the brothers shaping out for themselves such different destinies in the world as their natural disposition might indicate. What is to be noticed, what attracts attention, is the lavish outpouring of royal favours on the naturalist, while disgrace fell on the statesman; and "a smile went round the circles, both of philosophy and politics, when Alexander, in planning the scheme of his great work on the 'Kosmos,' proposed to omit the whole subject of Mental Philosophy." It was a proof of his prudence rather than of his philosophical ardour that he should design a delineation of the universe, and its motive forces, and omit "the most marvellous of all manifestations and forces." But by so doing, he avoided the dis-



SCENE IN THE HARZ.





cussion of subjects not regarded with complacency by an absolute sovereign.

Friedrich Heinrich Alexander, Baron von Humboldt, was born at Berlin, as already stated, on the 14th of September 1769. He received his education at Berlin, at Göttingen, and at Frankfort-on-the-Oder. During his sojourn at Göttingen, in 1789 and 1790, he displayed his strong predisposition for scientific pursuits, and made numerous excursions to the Harz, which are so rich in mineral treasures, and to the banks of the Rhine, for the purpose of studying volcanic phenomena. In the spring and summer of 1790, he went on a tour through Belgium, Holland, England, and France, in accordance with the old and wise belief that foreign travel was a necessary part of a liberal education. In June 1791, he attached himself, in order to advance his scientific instruction, to the Mining Academy at Freiburg, and became a pupil of Werner, the great geologist, the author of what was formerly known as the "Plutonian system," by which the physical phenomena of the world were explained as produced by the agency of fire. Humboldt was afterwards appointed to an office in the mining department, and in discharge of his

duties resided for some years at the Fichtelgebirge, in Upper Franconia.

Nothing could be more marked, as one of his biographers observes, than his early partiality towards scientific research, and his love of travel as a means of scientific education. He lived in a stormy era, when all Europe was convulsed by the thunder of battle, and the French Revolution had overthrown the ancient foundations of law and order. But he would not suffer himself to be daunted in the pursuit of knowledge by the obstructions of war. The movements of hostile armies and the ambitions of rival states had no interest for the scientific enthusiast, who was filled with an ever-increasing desire to explore the heights, and depths, and expanses of the Earth, so that he might discover the secrets of Nature. He was fain to read the face of the visible world, and decipher the meaning of all its signs and characters. All things are engaged, it has been said, in writing Nature's history; and this history Humboldt desired to read. "The planet, the pebble, goes attended by its shadow. The rolling rock leaves its scratches on the mountain, the river its channel in the soil, the animal its bones in the stratum,

the fern and leaf their modest epitaph in the coal. The fallen drop makes its sculpture in the mud or stone; not a footstep in the snow, or along the ground, but prints in characters more or less lasting a map of its march; every act of man inscribes itself in the memories of his fellows, and in his own face. The air is full of sounds, the sky of tokens, the ground of memoranda and signatures; and every object is covered over with hints, which speak to the intelligent." It became Humboldt's life-work to collect these hints, and signs, and tokens; to determine their relation to one another; and build up, as it were, a system of the universe, a harmony of creation.

Natural Science, when Humboldt began his investigations, was a mass of fragments. It was so confused and chaotic that no view of the whole had been attempted or seemed practicable. Geology was in its infancy; and the student found himself involved in what was, indeed, "a mighty maze," the plan of which no man had apprehended. Even in the present day his guides often fail him, and he is continually coming in contact with problems to which no solution is offered. But in Humboldt's time all was vague, irregular, undefined to an

extent of which we can scarcely form a conception.

The ardent mind of the young philosopher was inspired with the great idea of establishing the mutual relations of all the sciences, and all the departments of each science; of exhibiting these relations, after he had carefully investigated the details, and had thoroughly generalized the results in the various departments. Many are the youths, says Miss Martineau, who have formed this conception—many, who have gallantly resolved upon the mighty work; but, since Aristotle, Humboldt is the most remarkable, perhaps he is the only, example of an approach to the achievement of such a scheme.

It is right to add, however, that, in Miss Martineau's opinion, others have approached as nearly, when the disadvantages of their times are taken into consideration. She thinks that Humboldt's achievements, wonderful as they are, fall short precisely in the points in regard to which he himself had formed the highest expectations. She concedes that his investigation and arrangement of details was perfectly marvellous from its scope and equality of treatment; his generalizations were so

splendid, and so fruitful beyond all estimate, that it is a reluctant judgment which ranks them below his more concrete studies, in regard to quality; but there can be no difference of opinion about his failure in his highest effort, as exhibited in his "Kosmos." But may it not be said that this failure, so far as it is a failure, is due, not to any want of mastery or intellectual force or precise knowledge on the part of Humboldt, but to the immensity of the effort, which surpasses the powers of any single mind? All that he could accomplish he *has* accomplished; he has indicated the way by which others may reach the goal; he has laid the foundations on which others may raise the superstructure. He was like a pioneer in a virgin forest, whose progress is obstructed by the necessity of gathering up the signs on either hand which show in what direction he may advance, who has to fell down the huge trees and clear away the parasitic growth, and, at last, succumbs to the inevitable doom before his work is finished, leaving it for others more fortunate to take it up where he has been compelled to leave it off. When we reflect upon the immensity of the area which Humboldt attempted to traverse, on the vast number of details

which he attempted to seize and correlate, we need not wonder that he "was forced to halt, waver, and diverge in his presentment of the great Scheme of the Universe." The wonder is, that he achieved so much.

In 1795 he began to prepare for those Transatlantic voyages of discovery which were necessary to his great project, and had occupied his mind from his earliest years. "I had from my earliest youth," he says, "felt a burning desire to travel in distant lands unexplored by Europeans. This desire characterizes a period in our existence in which life appears to us an unbounded horizon, where nothing has greater attractions for us than strong emotions of the soul and physical dangers. Brought up in a country which had no immediate connection with the Indian colonies, and residing subsequently in mountain districts, which, far from the sea-shore, are famed for their mines, I felt a violent passion for the sea, and for long maritime voyages, develop in my soul. All objects which we know only by the descriptions of travellers have an especial charm: our fancy is pleased with whatever appears infinite and unlimited. The enjoyments which we do not share seem to us to have greater charms than those

which fall to our share in the narrow circle of our quiet life."

Giving up his post at Freiburg, he resolved on tasting some at least of these enjoyments, and paid a visit to the classic land of Italy; though it was not the beauty of its scenery, the magic of its associations, or its wonders of art and antiquity that attracted him, but the scientific phenomena exhibited in the volcanic districts of Naples and Sicily. Owing to the war, however, he was unable to penetrate further than Upper Italy. Here he met with Galvani, and learned from him his great discovery, the discovery of that marvellous electric force which has led to such astonishing and valuable results. The death of his mother, however, recalled him home; and early in 1797 he met with his brother at Jena, and remained with him for some months. His sojourn afforded him an opportunity of making the acquaintance of the poet Goethe, who was greatly interested in his experiments in galvanism, and on the latent electricity in animals. But his dominant idea was still foreign travel; and Schiller writes of him and his brother, whom he had filled with his own enthusiasm, that "though the whole Humboldt family, down to the servant, lie ill

with ague, they still talk of nothing but great journeys."

In the summer of 1797 the two brothers had arranged for a tour in Italy; but the intelligence which reached them of the brilliant conquests of Bonaparte, whose star was then rising rapidly above the European horizon, compelled them to abandon their project. Alexander, accompanied by the eminent physicist, Leopold von Buch, paid a visit to the Alpine passes and peaks of Salzburg and Styria; and in the following year, joined his brother at Paris. Here he learned that a French scientific body was fitting out an expedition, under Captain Baudin, to make a voyage of discovery in the Southern Hemisphere. His soul was all aflame at the news! Having made the acquaintance of one of the naturalists attached to the expedition, Aimé Bonpland, he soon obtained permission to share in it, and with characteristic eagerness made the necessary preparations. Again was the enthusiast doomed to disappointment! War swallowed up the funds which the French Government had at its disposal, and the expedition was abandoned. Still Humboldt did not despair. A Transatlantic journey had become the purpose of his life, and he con-



tinued his preparations in patient expectation of another opportunity.


That opportunity came at last, as it comes to all men who have the patience to wait and the vigilance to watch for it. Early in 1799, he and his friend Bonpland, being in Madrid, were introduced to the King of Spain, who listened with a favourable ear to their idea of a scientific excursion, and finally gave them permission to visit all the Spanish possessions in the New World. Encouraged and assisted by the royal patronage, Humboldt and Bonpland lost no more time in preparation, but journeyed at once to Corunna, so soon afterwards the scene of a British victory and a hero's death, where they embarked on board the corvette *Pizarro* bound for Mexico and Havannah. The port, at the time, was blockaded by English cruisers, and thus some delay was caused; but in their temporary absence, on the 5th of June, the *Pizarro* escaped from the harbour, and favoured by a fresh westerly breeze, put out to sea.

What must have been the emotions of Humboldt when at last he saw the hope and desire of so many years on the eve of fulfilment! With what joy he must have gazed on the last light which fluttered

on the European coast, and as the ship steered for the westward, became less and less distinguishable from the stars which rose on the horizon! In after years, he exclaimed, "Oh, these impressions will never pass away from my recollection! How many memories does not one bright spot shining unsteadily over the rolling waves through the night-darkness, and pointing out the shores of our native land, recall to the imagination!"

## CHAPTER II.

### HIS EARLIER TRAVELS.

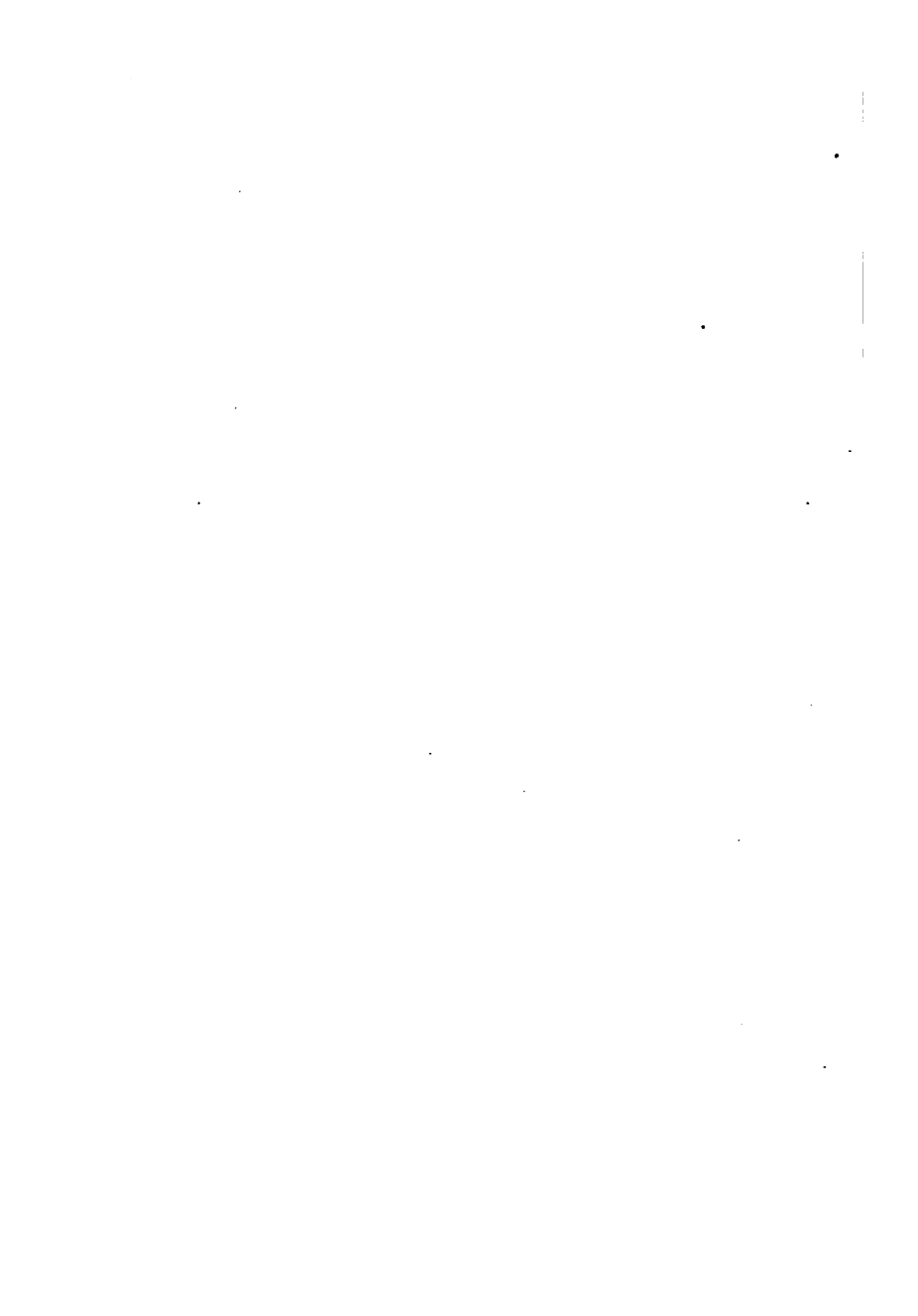
HE voyage, to an observant mind like that of Humboldt, was full of interest. Every day, every league of sea, brought some fresh attraction, some new object of study. The currents of ocean, the course of the Gulf Stream, the flight of the sea-swallow, the gambols of the dolphin, and the phosphorescent radiance with which an innumerable host of medusæ covered the waters, in turn occupied his investigations. A shower of shooting stars led to his inquiry into the causes of that phenomenon. He greeted with delight a messenger from the land, a martin, which, weary and exhausted, alighted on board the corvette. Frequently he and his friend spent a part of the night on deck, and watched the volcanic peaks of the island of Lancerota as they were

successively touched by the moonlight; and the beautiful constellation of the Scorpion flashing above them, when the moon was for a while obscured by passing clouds. Then, on the gradually fading shore, they saw the shifting fires, which the fishermen carried from point to point, while preparing to launch their boats; reminding Humboldt of those traditional moving lights which Columbus and his companions saw with so much emotion on their first approach to the regions of the great Western World.

The famous Peak of Teneriffe was shrouded in mist when Humboldt's ship drew near it. As it is not crowned with eternal snow, it is, indeed, seldom visible at a great distance. The white pumice-stone which covers its sugar-loaf crest is entirely surrounded by blocks of black lava and a luxuriant vegetation. The *Pizarro* put into the harbour of Santa Cruz,—celebrated in the histories both of Blake and Nelson,—and Humboldt and Bonpland landed, with the view of making some excursions in the island. At Orotava, the point from which the ascent of the Peak is made, they saw around them a landscape of Arcadian beauty. The coast is covered with date and cocoa-nut palms; dragon-trees clothe the inland terraces; every rock and



**DRAGON-TREE OF OROTAVA.**



slope is garlanded with "purple vines;" here and there the white walls of a chapel shine out from a grove of glossy foliage, the orange, the myrtle, and the cypress; all the walls are enriched with a dense growth of mosses and ferns; and while the volcano above is frequently burdened with snow and ice, in the green valleys below prevails an eternal spring.

Humboldt regarded with curiosity the once famous dragon-tree of Orotava; a remarkable specimen of the *Dracæna* family, which rose to a height of about sixty feet, and measured forty-eight feet in girth near the ground. The huge trunk divided into a vast number of branches, which spread aloft in the form of a candelabrum, and terminated in tufts of leaves. The antiquity of this tree added to its attraction. It was held in the greatest reverence by the Guanches; and in 1402, when the island was first visited by Europeans, was exactly in the same condition as when Humboldt saw it. As the species is of slow growth, its age must have been very great. It is a curious circumstance that the dragon-tree, which is a native of India, and grows nowhere on the African continent, should have been cultivated in the Canary Islands at so early a period.

Leaving Orotava, the travellers ascended, by a narrow and stony path, through the cool shades of a chestnut-wood, to a spot covered with brambles, laurels, and arborescent heaths, where, under a lonely pine, known as the *Pino del Dornajito*, they obtained a supply of fresh water. Thence, up to the brink of the elevated crater, they continued their ascent without crossing a single valley; passing through several zones or regions distinguished by characteristic vegetation, and spending one night upon the mountain, during which they suffered severely from the cold. About three o'clock in the morning they began to climb the terminal cone, or Sugar-loaf, by the flickering light of torches of fir-wood; and examined a small subterranean glacier, or cave, from which the island-towns are supplied with ice during the summer.

For three hours they made their way, as best they could, over an exceedingly rugged tract, reaching at last the small plain called *La Rambleta*, from the centre of which springs up the *Piton*, or Sugar-loaf. The slope of this terminal cone, incrustated with pumice and volcanic ashes, is so steep that our travellers would hardly have reached the summit, had they not ascended by an old and indurated



lava-flow, which had in some measure resisted the atmospheric action.

On gaining the top of this declivity, they found the crater enclosed by a wall of compact lava, with only a single breach in it, providing a passage to the floor of the "caldera" or funnel, the greater diameter of which at the mouth they estimated to be three hundred and twenty feet. The crater was without any considerable crevasses or openings; but from some small chinks rose aqueous vapours, in which heat was perceptible. The volcano, however, has ceased to be active at the summit for thousands of years; its later eruptions having taken place from the sides. In depth the crater does not exceed one hundred and six feet.

The Peak of Teneriffe may be described as a huge isolated pyramid, 12,176 feet high, with a circumference at the base of fully 115,110 yards. Two thirds of this mass are covered with vegetation; the remaining part is barren. The terminal cone of which we have spoken is very small in proportion to the size of the mountain, being only five hundred and thirty-seven feet high.

The Island of Teneriffe enjoys a variety of climates, ranging from the Tropical to the Arctic,

and indicated by five distinct zones of vegetation, which ascend in stages or terraces, one above another, to a total elevation of 11,190 feet.

First, we find ourselves in the *Region of Vines*, which stretches from the shore upward to a height of 1300 to 1950 feet. Here the fertile soil is carefully cultivated. The prevailing character of the vegetation, with its mesembryanthemums, and dracænas, and euphorbias, is African; and the visitor surveys with interest their bare, tortuous trunks, succulent leaves, and glaucous or bluish-green colouring. But in the same zone flourish the useful date-tree, the plantain, the emerald sugar-cane, the olive, the Indian fig, the vine, and the fruit-trees and cereals of Europe.

Ascending, next, to an elevation of from 2000 to 5500 feet, we pass into the *Region of Laurels*, or woodlands of Teneriffe, where silvery rills wind ribbon-like over slopes carpeted with fresh and fragrant turf. The trees are festooned with beautiful creepers and climbing plants, and their trunks are green with ivy; while numerous species of ferns thrive in the sheltered glades. The green-sward is enamelled with a mosaic of glowing blossoms; and the charm of the scene is greatly

.



PEAK OF TENERIFFE



enhanced by the foliage of four kinds of laurel, arbutes, oaks, wild olives, and various evergreens.

At an altitude of 5760 feet begins the *Region of Pines*, where the traveller climbs through the gloomy shades of a vast forest of conifers, resembling the Scotch fir, intermingled with juniper. It is in this zone that the artist will find some of the most picturesque scenery of the island; "bits" with a Salvator-Rosa-like savagery about them.

Ascending another 2550 feet we come to the fourth zone, where the distinctive growth is the *retama*, a species of broom, flourishing on a soil composed of volcanic ashes. It grows to the height of nine or ten feet, blooms with sweet-scented flowers, and affords sustenance to the goats which, from time immemorial, have frequented the rocky Peak.

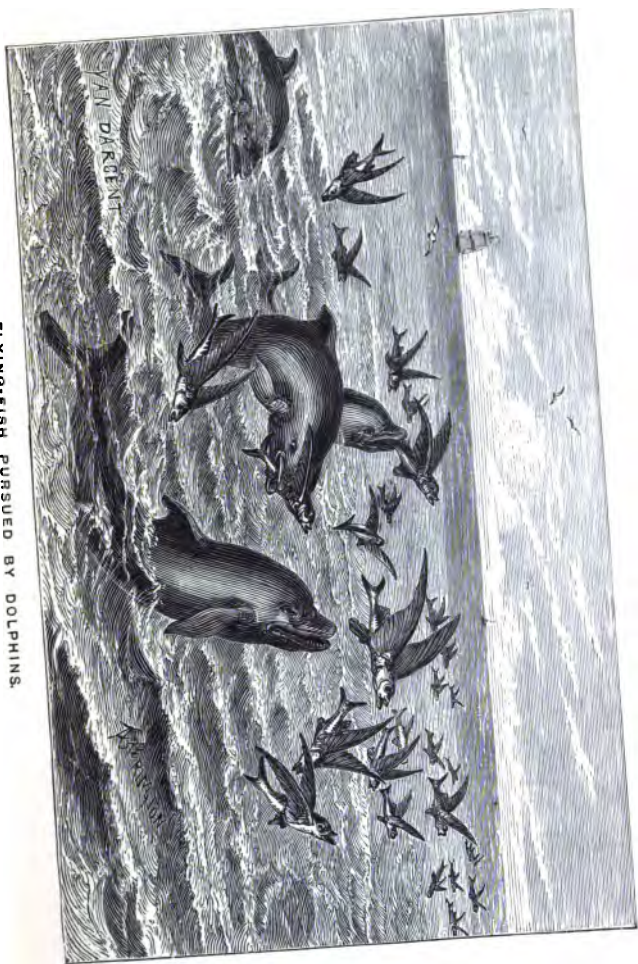
Lastly, we come to the *Region of Grasses*, where a scanty verdurous growth helps to relieve the desolate tracts of pumice, obsidian, and lava. A few cryptogamic plants expatiate at a still higher elevation; but the summit itself is bare even of a blade of grass.

Humboldt sailed from Santa Cruz on the 25th of June, bound for Cumana, a distance of 3106 miles,

accomplished in twenty days. After passing the 22nd parallel, he observed that the ocean-surface teemed with flying-fish, which sprung into the air to a height of twelve, fifteen, or even eighteen feet, sometimes falling on the vessel's deck. They are able to traverse in the air a course of twenty to thirty feet, through the support afforded by their pectoral fins and swimming-bladder, which are of great size. Their flight is by no means voluntary, but is part of the struggle for existence which they incessantly maintain against their numerous enemies, —amongst which may be named the dolphins in the water, and frigate-birds and other birds of prey in the air.

The glories of the Southern sky engaged at night the rapt attention of our philosopher, and his heart was astir with emotion as constellation after constellation rose upon his admiring gaze. "One experiences an indescribable sensation," says Humboldt, "when, as he approaches the Equator, and especially in passing from one hemisphere to the other, he sees the stars with which he has been familiar from infancy gradually approach the horizon, and finally disappear. Nothing impresses more vividly on the voyager's mind the vast

FLYING-FISH PURSUED BY DOLPHINS.







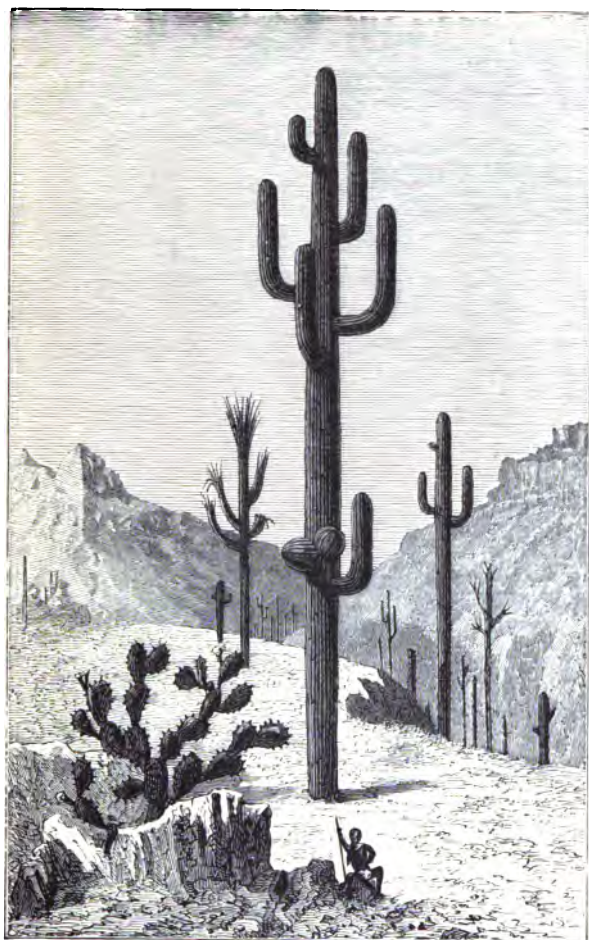
distance which separates him from his native country than the sight of a new firmament. The grouping of the larger stars, the scattered nebulae rivalling in lustre the Milky Way, the interspaces remarkable for their intense darkness—all these lend a peculiar character to the Southern heavens, which strikes the imagination even of those who, though ignorant of astronomy, experience such delight in contemplating the celestial arch as we feel in admiring a magnificent landscape. Without being a botanist, the traveller knows the Torrid Zone by the mere aspect of its vegetation; and without being an astronomer, he perceives that he is not in Europe, when he sees rising above the horizon the great constellation of the Ship, or the luminous Magellanic clouds.” As Tennyson sings :—

“Larger constellations burning, mellow moons and happy skies.”

As a contrast to these intellectual enjoyments, Humboldt experienced the terrible scourge of illness on board a ship. A malignant fever broke out, and increased in severity, as the *Pizarro* approached the West Indies. A youth of nineteen years of age, the youngest of the passengers, died; and his death made a deep impression on Humboldt from the

circumstances connected with his journey, which had been undertaken in the hope of securing a sufficient provision for a beloved mother. Humboldt was sitting on the deck, agitated by sad reflections; the fever in the cabins grew ever more malignant; his gaze rested on a barren, mountainous coast, fitfully lighted up by the moon through rifts in the deep dark clouds. The sea shone with a weak phosphoric light; no sounds were heard but the ripple of the waves and the plaintive cry of sea-birds winging their way towards the rocks. All at once, about eight o'clock in the evening, the death-bell mournfully tolled: the sailors flung themselves on their knees to breathe a short prayer by the corpse of the youth who, the day before, had been full of life and activity; in the course of the night it received the last benediction of the Roman Catholic Church; and, at sunrise, it was committed to the waves.

Humboldt and Bonpland now thought it prudent to land at Cumana, instead of proceeding further; and, as will be seen, this resolution had a most favourable influence on the direction of their journey, and eventuated in important results.



CACTUS PLANTS.



The city of Cumana is situated on the banks of the river Manzanares, which, a short distance below the city, pours its waters into the tranquil Gulf of Cariaco. As it is subject to violent earthquakes, it possesses no buildings of importance. The plains surrounding it are parched and dusty; but to the southward rises a stately mass of inaccessible mountains, the ridges of which are heavy with luxuriant forests. The immediate neighbourhood is remarkable for the woods of cactus which spread over the sun-burnt lands. Some of these are thirty or forty feet high, encrusted with lichens, and divided into branches like a candelabrum. When the larger kinds are grouped together in thickets, they form an almost impenetrable jungle, which is rendered dangerous by the poisonous serpents that frequent it.

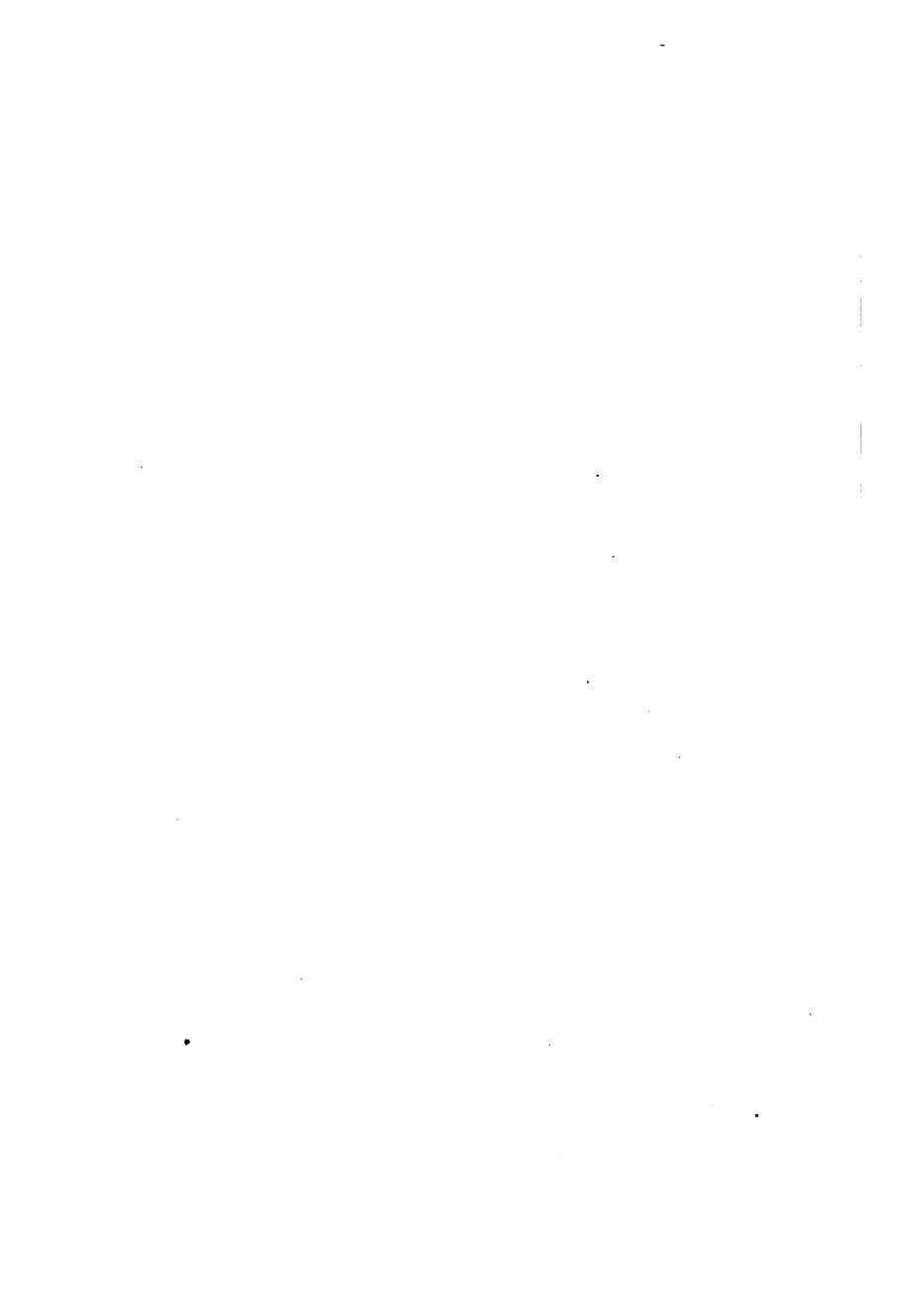
The coasts of Paria and Cumana are subject to frequent earthquake-shocks, which are often very disastrous in their effects. On the 21st of October 1766, the city of Cumana was shattered into ruins in the space of a few minutes. Again, on the 14th of December 1797, upwards of four-fifths of the city was again entirely destroyed. On previous occasions the shocks had been horizontal in their

direction ; but the shaking now felt was that of an upheaval of the ground, and was attended by a subterranean roar, like the explosion of a mine at a great depth. The most violent concussion, however, was preceded by a slight undulatory motion, so that the inhabitants had time to escape into the streets ; and only a few, who had fled for safety to the churches, perished. It is said that half an hour before the catastrophe, a strong smell of sulphur was detected near the Franciscan convent ; and flames broke out on the banks of the river and in the Gulf of Cariaco.

From Cumana, Humboldt and Bonpland made an excursion inland, and for the first time became acquainted with the profuse vegetation of a tropical forest. They observed that the leaves of the cecropia were more or less silvery according as the soil was dry or marshy. In cases where the leaves were entirely green on both sides, the roots were concealed beneath tufts of dorstenia, a plant which loves shade and moisture. Penetrating into the sylvan depths, they found papaws and orange-trees heavy with fruit. These they conjectured to be the remains of some Indian plantations, as they are not indigenous to the country.



THE PAPAW TREE.



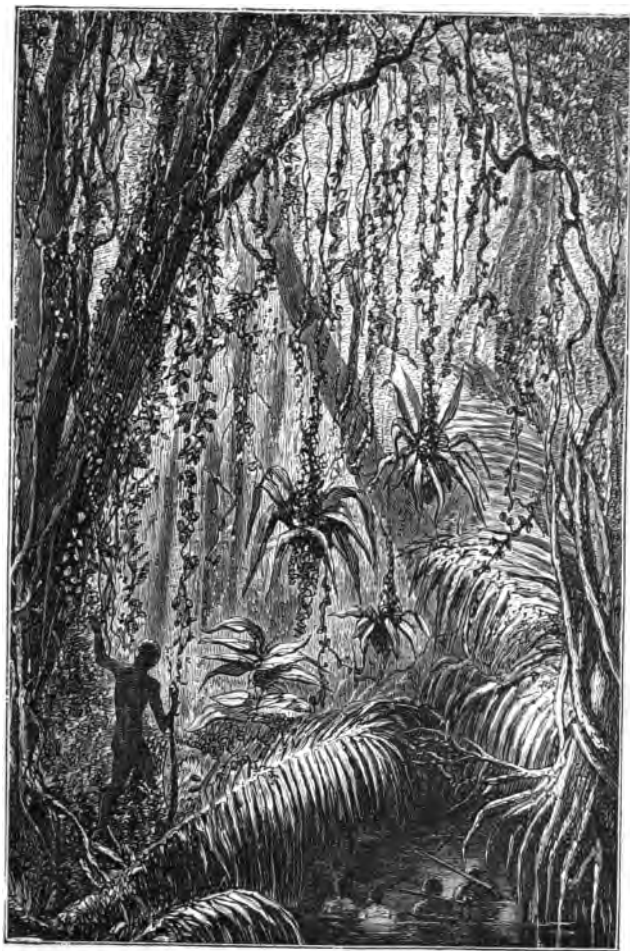


When, as Humboldt remarks, a traveller for the first time enters the South American forests, he sees Nature in an unexpected and a novel aspect. The objects by which he is surrounded bear but a slight resemblance to the pictures drawn by celebrated writers on the banks of the Mississippi, in Florida, and in other temperate regions of the New World. At every step he perceives that he is not upon the verge but in the centre of the Torrid Zone ; not in one of the West India islands, but upon a vast continent, where the mountains, the rivers, the vegetation, are all on a gigantic scale. If he be sensible to the beauties of rural scenery, he finds some difficulty in accounting to himself for the varied feelings which he experiences. He cannot determine what most excites his admiration ; whether the solemn silence of the wilderness, or the individual beauty and contrast of the forms, or the vigour and freshness of vegetable life peculiar to the tropic world. It seems as if the earth were so overloaded with plants as to spare them no room for growth. Even the trunks of the trees bear witness to Nature's exuberant vitality ; and the orchids, the creepers, the epiphytous plants which grow upon a single American fig-tree, would extend

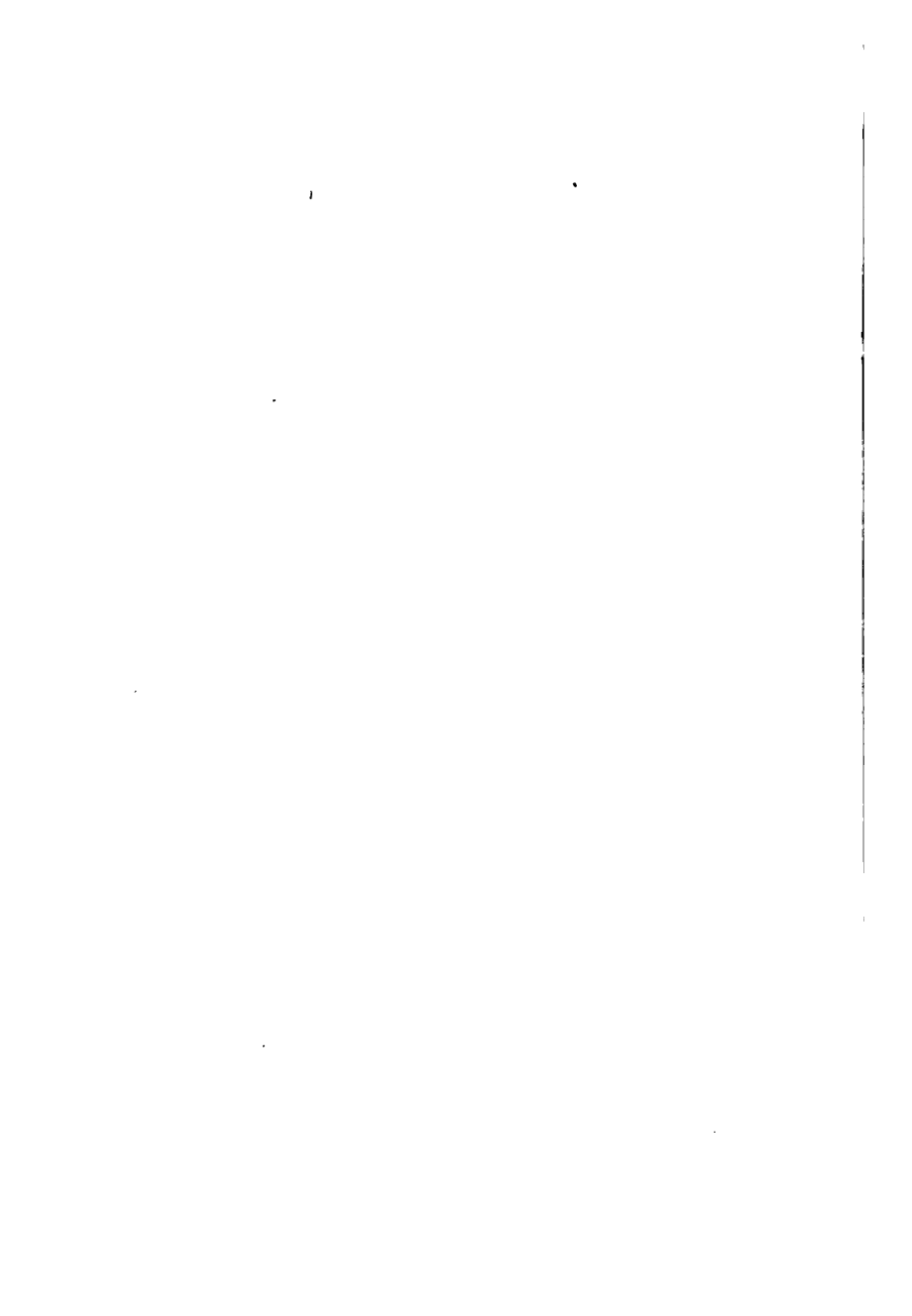
over a considerable space if they were transferred to the ground. The same lianas which creep along the earth twine and climb to the tops of the trees, and pass from the one to the other at a height of upwards of one hundred feet. Wherever the traveller sets his feet, he finds Nature teeming with life as inexhaustible as vigorous.

Since Humboldt's time the wonders of the tropical forests have been made known to us by H. W. Bates, and A. R. Wallace, and Professor Agassiz; and we have grown familiar with their colossal trees, their wealth of creeping and climbing plants, their number and variety of ferns. Yet the description never wearies us; and every traveller is able to supply some fresh particulars, some additional details of interest, so diversified and so abundant are Nature's stores.

For some hours our two philosophers wandered under the shade of the leafy arches, which scarcely admitted a gleam of the sapphire sky; and for the first time admired the bottle-shaped, artistically wrought, and pendulous nest of the oriole, whose rough voice is heard above the murmur of the waterfalls. Thence they proceeded to the Cuchivano ravine, following up a path rendered unsafe



A SOUTH AMERICAN FOREST



by the prowlings of the jaguar. Flames issue from caves in this ravine, which at night are visible from a great distance, like those of our British iron-works. They are connected, of course, with latent volcanic forces; and earthquakes are of frequent occurrence in the surrounding district.

On the 12th of August, after much climbing, Humboldt arrived at the principal station of the Chaymas (Roman Catholic) mission, the convent of Caripe, where he remained for a brief period. He was much struck by the beauty of the nights. Nothing, he says, can be compared to the solemn repose which the contemplation of the starry firmament in this wilderness affords. When, at nightfall, his eye rested on the meadow-plains bounded by the horizon, it seemed to him as if the star-studded vault of heaven rested on the surface of the ocean. The tree beneath the shade of which he rested, the luminous insects sparkling like innumerable points of fire in the air, the radiant Southern constellations, all reminded him that he was far from his native land. In the midst of this strange and surprising scenery, when the tinkling cowbell or the lowing of a bull was heard from the valley below, the remembrance of his fatherland was

instantly awakened. These sounds were like distant voices from beyond the sea, which transported him to the other hemisphere, and the inexhaustible spring of joy and sorrow gushed forth in his imagination.

The object of greatest interest in the neighbourhood of the convent is the guacharo cave, which Humboldt was the first to make known to Europe. Descending into a valley, he and his companion proceeded westward along the course of a small river which issues from the grotto, until they arrived at the foot of the lofty mountain of Guacharo. Here the torrent foamed in a deep ravine; and they cautiously picked their steps under an overhanging cliff which shut them out from the sky, until, suddenly turning a sharp angle, they came upon the immense opening of the recess, which measures eighty-five feet in breadth by seventy-seven feet in height. The entrance faces the south, and is hollowed out of the precipitous face of a rock, clothed with gigantic trees, intermingled with and beautiful plants, the whole forming greenery, or a curtain of foliage and Nor is this profuse vegetation confined

to the exterior of the cave. It invades even the outer recess, where the travellers were astonished to see arborescent arums, heliconias nineteen feet in height, and tufted palms.

After advancing about four hundred and sixty feet, they could hear from afar the hoarse screams of birds, while they paused to light their torches or fir-wood.

The guacharo is a night-bird, and cannot bear the light of day. In size it resembles a domestic fowl; in appearance, a vulture; while it has a mouth like that of a goat-sucker. Its plumage is a dark bluish-gray, closely streaked and spotted with brown; the head, wings, and tail being marked with white spots, black bordered. It measures three feet and a half in breadth across the wings. It lives in caves, and goes forth in search of the fruits on which it lives, in the evening. Its shrill, unpleasant cries, echoing through the vaulted cave, produce quite an eëry effect. The nests are placed in funnel-shaped holes in the roof.

Every midsummer, the Indians, equipped with poles, enter the cave, and destroy the greater part of the nests. Several thousands of young birds are thus destroyed, while the old ones flutter

and maintain a chorus of discordant lamentations. The victims are cut open on the spot, to obtain the fat which exists abundantly in their abdomen; and this is subsequently melted in clay vessels over fires of brushwood. It forms a semi-fluid, transparent, scentless substance, which will keep for a year without turning rancid.

Humboldt and his companion followed the bank of the small stream which waters the cavern until arrested by masses of calcareous incrustation; and then they descended into its bed. The cave preserved the same direction, breadth, and height as at its entrance, to the distance of 1554 feet. As it is a belief of the Indians that its dark recesses are frequented by the spirits of the departed, the natives attending our travellers could hardly be persuaded to penetrate into the interior. Humboldt and Bonpland, therefore, having completed their drawings and their collections, began their return.

A day or two afterwards the travellers quitted the pleasant shelter of the convent, and proceeded to descend the mountain. In a dense forest through which they made their way, they observed some colossal trees, one hundred and thirty feet high, while in others the circumference measured twenty-



seven feet. They noticed also the curious plant of the dragon's-blood, its white bark stained with its purple juice; also various species of palms, and arborescent ferns. The ferns diminished in number, and the palms increased, as they descended the mountain. Large-winged butterflies of gorgeous colouring flitted across their path, and every sign indicated their approach to the coast. They were worn and weary when they arrived at Cariaco; but as the town was visited with an epidemic of fever, they left it with little delay, embarking on board a small brig for Cumana. Adverse winds, with heavy rain and thunder, rendered the voyage peculiarly disagreeable; and the travellers were forced to land at Pericaultral, a small farm on the south side of the gulf. In the neighbourhood the cocoa-tree proved to be the principal object of cultivation. It thrives most vigorously where it can enjoy the sea-breezes; and like the sugar-cane, the plantain, the mammee-apple, and the alligator pear, may be irrigated either with salt water or with fresh. In a moist and fertile soil it begins to bear abundantly in the fourth year; but in dry soils it produces no fruit until the tenth. Generally, its duration does not exceed ninety or one hundred years; at which period

it measures about eighty feet in height. A good tree supplies about a hundred nuts annually.

Humboldt remained for some weeks at Cumana, but his stay was marked by an unpleasant incident. He and his companion were sauntering along the beach one evening, when they heard the sound of footsteps behind them, and turning, beheld a tall Zambo—that is, a cross between a negro and an Indian—who, rushing forward, aimed a great palm-tree club at Humboldt's head. He escaped the blow by leaping aside; but a second blow struck Bonpland on the temple, and felled him to the ground. Humboldt assisted the latter to rise, and both hastened after the ruffian, who had run off with one of their hats. On being seized, he drew a long knife from his trousers; but some Biscayan merchants came to their assistance, and the Zambo, finding himself overmatched, sought refuge in a cow-house, from which he was led to prison. The object of this outrage was never satisfactorily explained.

The travellers met with another and scarcely less alarming experience. On the 4th of November, about two in the afternoon, large black clouds obscured the neighbouring mountains, and spread



COCOA-NUT PALMS.



over the sky a veil as of night. About four, thunder was heard overhead, but at an immense height, and in dull, fitful peals. Suddenly, two shocks of earthquake were felt, the one separated from the other by an interval of fifteen seconds. The people in the streets uttered loud cries of terror and apprehension. Bonpland, who at the time was examining some plants, was nearly thrown to the ground; and Humboldt, who was lying in his hammock, felt it violently agitated. The sky remained cloudy, and after a brief gust of wind, a dead calm prevailed. The sunset was indescribably magnificent. The dark pall which enveloped the heavens was cloven through, close to the horizon, and the sun appeared with a red disk, strangely distorted and enlarged, on an indigo ground. The clouds seemed tipped with golden flame, and sheaves of rays, reflecting the most brilliant colours, darted across the lurid firmament. About nine in the evening a third shock was felt; after which the agitated earth subsided into tranquillity.

The effect of an earthquake on the human mind is necessarily very great. It shakes the confidence we have previously been accustomed to repose in the solidity of our planet. From our childhood, as

Humboldt remarks, we represent to ourselves the water as a mutable, the earth as an immutable and solid mass; for such is the result of our daily experience. But an earthquake shock, a trembling and an agitation of that earth which we believed to repose so securely on its immemorial foundations, destroys in a moment our long-cherished illusion. It is a kind of awakening, and a most unpleasant one; it teaches us that we have been deceived by the apparent calm of Nature. Thenceforward we listen with alarm to the slightest sound; and, for the first time, distrust the soil on which we have so long and so confidently set our feet. It is proverbially said, however, that familiarity breeds contempt, and certainly custom renders us gradually insensible to the greatest peril. And so, in countries where earthquake shocks are frequent, or at times when they are often repeated for several days, the feeling of uncertainty vanishes; we regain our courage, and are almost as indifferent to the undulating earth as the storm-tossed mariner is to the rolling of the wave.

From Cumana the travellers proceeded to Caracas; a town of thirty thousand inhabitants, which, like

Cumana, has on more than one occasion experienced the disastrous effects of a violent earthquake. Yet nowhere else does Nature assume a fairer aspect; nowhere else does she pour out her bounties more freely. The poet does not speak in more glowing terms of the vale of Kashmir than does our grave philosopher of the vale of Caracas;—it is a paradise, an Eden-garden, radiant in the smile of an eternal spring. Its beauty is rendered all the more dazzling by its contrast with the stern and gloomy mountains which surround it. The coffee-tree thrives there luxuriantly; the sugar-cane thickly covers its verdurous slopes. The banana and the pine-apple, the vine, the strawberry, the quince, luscious peaches and fragrant apples, together with maize, pulse, and corn, grow in great perfection.

Humboldt's most important undertaking, while at Caracas, was the ascent of the Silla, a mountain which the natives seem to have regarded as inaccessible. The novelty of the excursion, therefore, attracted sixteen persons besides Humboldt and Bonpland, and the little company started on the 22nd of January 1800. The road was laborious and difficult; but it traversed scenery so rich and fair that both labour and difficulty were

forgotten. As the explorers advanced, however, they found that courage was required as well as perseverance. Not a few confessed to alarm and hesitation; and one, a young monk, halted when half way up, and watched the further progress of Humboldt and his companions through a telescope. At a height of six thousand feet they came upon a breadth of fresh green pasture, besprinkled with brambles, and little yellow liliaceous flowers. In vain they sought for a wild rose; not a single species of which did Humboldt meet with in South America, except the Montezuma, which blooms on the Mexican mountains in the nineteenth degree of latitude.

On arriving at the summit, Humboldt and his friend experienced a pleasure similar to that which, seven months before, they had enjoyed on the Peak of Teneriffe. The enjoyment of a richly varied panorama of a new country was combined with the intellectual delight of scientific research. From that lofty watch-tower of Nature's own creation he gazed on a landscape which man had as yet done nothing to modify or injure; on a wilderness of beauty as yet untamed by civilization; on a world abandoned wholly to plants and animals, where



human voices as yet had sounded neither in lamentation nor in joy. It was with difficulty that he tore himself from that summit, eight thousand feet in height, which the evening mists were already beginning to veil ; and with his companions entered upon the homeward journey. The shades of night overspread the scene before they had traversed the forest path, and reached the bottom of the ravine.

A few years after Humboldt's visit, the valley of Caracas became the theatre of a terrible display of the volcanic force. From the beginning of 1811 until 1813, a considerable area of the Western Hemisphere, included within the meridian of the Azores, the valley of the Ohio, the Cordilleras of New Granada, the coast of Venezuela, and the volcanic belt of the West Indies, was agitated by subterranean convulsions, the results of a common action taking place at a great depth in the interior of the globe. Simultaneously with the commencement of earthquakes in the Mississippi valley, the city of Caracas experienced the first shock in December 1811, and on the 26th of March 1812 was totally destroyed. The circumstances are thus related by Humboldt, who afterwards collected the particulars :—

The 26th of March was a day of excessive heat, with an unclouded sky and a tranquil atmosphere. It was Holy Thursday, and the majority of the inhabitants of Caracas were assembled in the churches; for no signs of the coming peril had disturbed them. A few minutes after four o'clock in the afternoon a shock was felt, which lasted for five or six seconds, and set the church-bells ringing. It was immediately followed by a second shock, of from ten to twelve seconds in duration, and the ground began to heave and undulate like boiling water. It subsided; all danger seemed to be over; when, suddenly, a tremendous subterranean noise was heard, resembling the rolling of thunder, but louder and more prolonged than even the worst peals of a tropical storm.

This roar or crash preceded a perpendicular motion of about three or four seconds, followed by a somewhat longer undulatory motion. The shocks came in opposite directions, from north to south, and from east to west; and it was impossible for anything to resist their violence. The city was overwhelmed in ruins. From nine thousand to ten thousand inhabitants, it is said, were buried under the prostrated houses and churches. The usual

religious procession had not yet set out from the cathedral, and so great was the crowd in the churches that nearly three thousand or four thousand individuals were crushed to death by the fall of the vaulted roofs.

The explosion was felt most seriously on the north side of the town, in the quarter nearest the mountains of Avila and the Silla. Here the churches of the Trinity and Alta Grazia, which were more than a hundred and fifty feet high, were struck to the ground, as by the hammer of Thor, and reduced into a chaotic mass of masonry, nowhere higher than five or six feet. The barrack buildings entirely disappeared; and a regiment of infantry, assembled under arms to join the procession, was, with the exception of a few fortunate persons, buried beneath them.

Nine-tenths of a flourishing city were entirely reduced to ruins. The few houses which did not fall gaped with such alarming fissures that no one could venture to live in them. In the southern and western districts the effects were less disastrous; and the great cathedral, with its enormous buttresses, remained unshaken.

In computing the number of killed at nine

thousand or ten thousand, Humboldt says that he does not include\* those unhappy individuals who were severely wounded, and perished several months afterwards from want of food and proper care. The night of Holy Thursday, he adds, will ever be remembered for the distressing scenes of desolation and sorrow which it presented. The dense dust-cloud, which rose above the ruins and darkened the air like a mist, had fallen again to the ground ; the shocks had ceased ; never was night calmer or more beautiful ;

"Countless stars  
Studded heaven's dark-blue vault ;"

the moonlight fell in floods of silver on the rounded summits of the Silla ; and the serenity of the heavens contrasted strongly with the wreck-strewn earth. Mothers might be seen carrying in their fond arms children whom they vainly hoped to recall to life ; weeping women ran through the shattered streets in quest of a brother, a husband, or a friend, of whose fate they were ignorant, and whom they supposed to have been separated from them in the confusion. Everywhere was sorrow, and panic dread, and despair.


\* There can be little doubt, however, that Humboldt's informants grossly exaggerated.

The wounded, buried under stone or column, implored the assistance of the passers-by with loud cries, and upwards of two thousand were dug out. Never was pity displayed in a more touching or pathetic manner; never was it more ingeniously active than in the efforts made to succour the distressed. There was an entire want of implements fitted for digging up the ground and clearing away the ruins; and to disinter the living, men and women eagerly set to work with their hands. The wounded, as well as the patients who had escaped from the hospital, were removed to the shelter afforded by the leafy trees that line the bank of the little Guayra river. Their condition was deplorable; for beds, surgical instruments, medicines,—in fact all the appliances necessary for their proper treatment, had been buried in the ruins. For the first day or two after the catastrophe nothing could be procured, not even food. Within the city water became equally scarce. The convulsions had broken the pipes of the fountains, and the falling in of the earth had obstructed the springs which supplied them. For supplies the inhabitants were forced to go as far as the Guayra, which had risen considerably; but there were no vessels for drawing the water.

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## CHAPTER III.

### TRAVELS IN SOUTH AMERICA.

E must now take leave of the city of Caracas, and accompany our travellers on their way to the Orinoco, the great river which Orellana first made known to Europeans. They followed the course of the Guayra, through sugar and coffee plantations, until they ascended a steep hill to the table-land of La Buenavista. Thence they fared onward to a steep ravine enlivened by a bright cascade, and revelling in an exuberant and a diversified vegetation,—consisting of gigantic figs, palms, heliconias, tree-ferns upwards of twenty-seven feet in height, and browneas which bear four or five hundred purple flowers in a single thyrsus, fifty or sixty feet high.

In the valley of the Tuy, which they next entered, the travellers turned aside to visit a gold mine. In

the ravine leading to it an enormous ash-tree attracted their attention. It had grown on a steep bank above a house, which it was thought it would injure in its fall, if a landslip took place. Therefore it had been burned near the root, and cut so as to sink between some large fig-trees which acted at once as a barrier and a support. At the lower end it measured twenty-five feet in girth, at the upper thirteen feet, and it was one hundred and sixty feet long. At the reputed site of the gold mine, our travellers found only some traces of a vein of quartz. They were repaid, however, for their trouble by the harvest of plants which they reaped in the dense untrodden forest. They were struck by the woody excrescences, or "buttresses," which, as high as twenty feet above ground, increased the thickness of the huge fig-trees. Mr. Bates has observed similar "buttresses" supporting many of the larger trees in the Amazonian forests.

Continuing their route, the travellers, on leaving a village called Turmero, discovered, at the distance of a league, what rose upon the horizon like a round hillock, or a tumulus clothed with vegetation. It proved, however, to be neither a hill nor a dense

group of trees, but a single tree, the celebrated *zamang of Guayra*, widely famed for the enormous extent of its branches, which formed a hemispherical top, or dome of foliage, six hundred and fourteen feet in circumference. The *zamang* is a beautiful species of mimosa, with light and graceful leaves of a delicate green. "The trunk of the *Guayra zamang*," says Humboldt, "is not more than sixty-four feet high and nine and a half feet in diameter; its real beauty consists in the general form of its top. The branches radiate like the spokes of a wheel, and incline towards the ground at a uniform elevation of twelve to fifteen feet. So regular is the circumference of the branches or foliage that the different diameters proved to be two hundred and five and one hundred and seventy-eight feet. One side of the tree was entirely stripped of leaves by the drought; on the other both foliage and flowers remained. The branches were festooned with creeping plants. The inhabitants of the neighbourhood, and especially the Indians, reverence greatly the *Guayra zamang*, which the Spanish conquerors seem to have found nearly in the same state as that in which Humboldt saw it. Its antiquity must at least equal that of the dragon-tree of Orotava."



Humboldt's wanderings next took him to the Spanish farms, or *haciendas*, in the valley of Cura, surrounded by flourishing cotton-plantations, and to the Lake of Valencia, with its fifteen islands. In the neighbourhood of Mariara he found the tall Voludor, the "winged fruit" of which he collected and sent to Europe, where the plant is now grown in numerous conservatories. The heat of the weather compelled him to continue his excursion to La Valencia. Travelling by night only, along a road infested by jaguars, he reached this beautiful town, visited some warm springs, and arrived at Porto Cabello. The harbour here is one of the finest in the world; it forms a kind of inland lake, opening to the westward by a passage so narrow that only one vessel can enter at a time. In the vicinity of this town our traveller first met with the cow-tree, or *palo de vaca*; the remarkable qualities of which had often been extolled in their hearing, but had scarcely commanded their belief. The leaves of the cow-tree are oblong and pointed; and it has a somewhat pulpy fruit, containing one and sometimes two nuts. When an incision is made in the trunk, a thick glutinous fluid issues copiously; it is milky in colour, agreeable in smell, and per-

fectly free from bitterness. The negroes and free people who work in the plantations drink of it abundantly, and our travellers felt no injurious effects from a liberal draught. When exposed to the air, it coagulates on the surface, in membranous layers, which possess an elastic quality; in five or six days it turns sour, and afterwards putrefies. There seems no reason to doubt that, when fresh, it affords a wholesome supply of nourishment.

Humboldt remarks that few of the numerous and remarkable objects he met with on his journey interested him so deeply as this cow-tree. This interest is partly due, of course, to early associations; for everything relating to milk and corn excites our sympathies, which are based not only on a thirst for a knowledge of natural facts, but on the idea and sentiment that without the milk which the breast of the mother affords, and without farinaceous food, we could not exist. Hence, perhaps, that religious veneration for corn and for milk-giving animals which has been exhibited by both ancient and modern nations. Such, in Humboldt's opinion, is the source of the astonishment with which we are seized on first seeing the cow-tree. "Magnificent forests, majestic rivers, and lofty mountains clothed



THE OOW-TREE.



in eternal snows, are not what we here admire. A few drops of a vegetable fluid impress us with an idea of the power and fecundity of Nature. On the parched side of a rock grows a tree with dry and leathery foliage, the large woody roots of which scarcely penetrate into the ground. For several months in the year its leaves are unrefreshed by a shower; its branches seem all dead and withered; but as soon as the trunk is bored, a sweet nourishing milk issues forth. At sunrise it is that this vegetable spring is most copious; then the negroes and the natives are seen coming from all parts with large bowls to collect the milk, which turns yellow and thickens on the surface. Some empty their vessels on the spot; others carry them home to their children. The traveller seems to see the family of a shepherd engaged in distributing the milk of their herd."

As it was his chief object to explore the junction of the Orinoco with the Rio Negro and the Amazon, Humboldt no longer delayed on the way, but on the 6th of March finally took leave of the valleys of Araguay. He and his companion then entered upon wide tracts of prairie, plains overgrown with

gigantic grasses, in which many a jaguar lurks, and which no shade refreshes, as the palm-tree growing here is parched, stunted, almost leafless.

Over Calabozo their route lay through the deserts of the llanos of Caracas, where Humboldt's attention was drawn to the gymnotus, or electric eel. This singular animal abounds in the stagnant pools and the confluents of the Orinoco. Desirous of obtaining some specimens, our philosophers, accompanied by some Indians, with a herd of thirty or forty horses, proceeded to a turbid basin of water. The unfortunate horses were straightway driven into it. The noise of their hoofs called the fishes from their muddy retreats, and excited them to combat. Then took place a scene, which Humboldt has described with characteristic vivacity :—

“These yellowish livid eels, resembling large aquatic snakes, swim near the surface of the water, and crowd under the bellies of the horses and mules. The struggle between animals of so different an organization affords a very interesting sight. The Indians, armed with harpoons and long slender reeds, closely surround the pool. Some of them climb the trees which stretch their branches horizontally over the water ; and by their wild shouts and long



CATCHING ELECTRIC EELS





reeds prevent the horses from coming to the edge of the pool. Stunned by the noise, the eels seek to defend themselves by repeated discharges of their electric batteries, and for a long time it seems as if theirs would be the victory. Several horses sink under the violence of the invisible blows which they receive in the most vital parts, and, benumbed by the force and frequency of the shocks, disappear beneath the surface. Others, panting, with mane erect, and haggard anguished eyes, raise themselves, and endeavour to escape, but are driven back by the Indians. A few, however, succeed in eluding the vigilant activity of the fishers; they gain the shore, stumble at every step, and extend themselves on the sand, spent with fatigue, and their limbs half paralyzed by the electric strokes of the gymnoti.

“Within five minutes a couple of horses were killed. The eel, which is five feet long, presses its body against the belly of the horse, and shoots its spark along the whole extent of its electric organ. It attacks at once the heart, the viscera, and the group of the abdominal nerves. It is natural that the effect which a horse experiences should be more powerful than that produced by the same fish on man, when it touches him only by one of the ex-

tremities. The horses are probably not killed but stunned; and are drowned amidst the confusion of the struggle between the other horses and eels."

The gymnoti at length dispersed, and drew near the brink of the pool, where five of them were taken by means of small harpoons fastened to long reeds. A few more were caught towards evening, and Humboldt finally obtained a sufficient number on which to make experiments.

It is well to remember that, as the philosopher himself remarks, that which constitutes the living but invisible weapon of these inhabitants of the waters; that which, awakened by the contact of moist and dissimilar particles, circulates through all the organs of animals and plants; that which, flashing amid the roar of thunder, illuminates the wide canopy of heaven; that which links iron to iron, and guides the silent recurving course of the magnetic needle;—all, like the refracted rays of light, flow from one common source, and all blend together into one eternal all-pervading power.

The travellers left Calabozo on the 24th of March, and pushed forward in a southerly direction. As they advanced, the country became drier and des-

titute of herbage. Gradually the palm trees disappeared. From eleven in the morning until sunset the thermometer marked 95°. The sky was brazen; the sun, an orb of fire. About four o'clock they observed in the open savanna a young Indian girl, of twelve to thirteen years of age, quite naked, lying on her back, exhausted with fatigue and thirst, and her eyes, nostrils, and mouth filled with dust. She gasped like one in a fit, and was unable to answer any questions addressed to her. Happily one of Humboldt's mules was laden with water, the application of which on her face aroused her. At first she was mute with terror; but gradually she recovered her composure, and conversed with the guides. As she could not be persuaded to mount one of the mules, nor return to Urituco, she was furnished with some water; on which she resumed her way across the plain, and was soon hidden from her preservers in a cloud of dust.

In the night our travellers forded the Rio Urituco, which teems with crocodiles of unusual ferocity, although those of the Rio Tisnao in the neighbourhood are not at all dangerous. A hut or shed was pointed out, in which a curious scene had been witnessed by one of their American friends. Having

slept in it on a bench covered with leather, he was aroused at dawn by a violent shaking, accompanied with a horrible clamour. Presently an alligator, two or three feet long, issued from underneath the bed, and darted at a dog lying on the threshold ; but missing its aim, it ran towards the river. When the spot was examined where the bench had stood, the dried mud was found turned up to a considerable depth ; there the alligator had lain in its state of torpidity or summer sleep. The hut being situated on the edge of a pool, and inundated during part of the year, the animal doubtless had entered at that period, and concealed itself in the mud.

On the 27th of March they completed their journey across the llanos, and arrived at the town of San Fernando, which is favourably situated on the Apure, a large navigable tributary of the Orinoco. All the productions of the province of Varinas pass through it on their way to the coast. Commerce is most active here during the rainy season, when the rivers burst their bounds, and spread their waters over a vast area of country. The savannas are then inundated to a depth of twelve or fourteen feet, and present the appearance of a great lake,

with the farm houses and villages islanded on hillocks that scarcely rise above the surface. Horses, mules, and cows perish in great numbers, affording abundant food to the zamures, or carrion-vultures, as well as to the alligators. The inhabitants, to avoid the violence of the currents, and the uprooted trees they carry down with them, find it safer to cross the watery levels in their boats than to ascend the course of the rivers.

Humboldt remained three days at San Fernando, which he spent in observing the atmospheric phenomena that inaugurate the rainy season. He then determined on proceeding to the Orinoco by water instead of by land ; and accompanied by the faithful Bonpland, embarked in a large lancha or canoe, with a pilot and four Indians for crew. In the stern was constructed a cabin, roofed with leaves of the corypha palm, and capacious enough to hold a table and benches. A month's stock of provisions was put on board, with fishing implements, fire-arms, and a few kegs of brandy, for bartering with the natives.

On the 30th of March they set sail. The river swarmed with fish, turtle, and manatees or "sea-cows." Passing the mouth of the Apurito, they

coasted along an island of the same name formed by the Apure and the Guarico, which measures sixty-seven miles in length. The shore was studded with huts of the Yaruroes, who live by hunting and fishing, and by the sale of the skins of jaguars. On the 31st our voyagers were detained by a contrary wind until noon. As they proceeded, the river gradually broadened; one of its banks being generally sandy and barren, the other, which was higher, covered with tall trees. Sometimes, however, it rolled its waters through a forest depth, resembling a straight canal nearly one thousand feet in length. Thick jungles of sauso\* clustered along the marge, rising about four feet high, with occasional gaps made by the jaguars, tapirs, and peccaries, which come down to the river to drink. Where the sauso receded some slight distance inland, the sandy bank was covered with crocodiles, in parties of eight or ten, lying motionless, and with open jaws, basking in the sun. So numerous were these monstrous reptiles, that throughout the whole course of the river five or six were usually in view, and hundreds still lay buried in the mud of the savanna. This species is not a cayman or alligator, but a real crocodile,

\* *Hermesia castaneifolia*.



**BOAT SURROUNDED BY CROCODILES.**



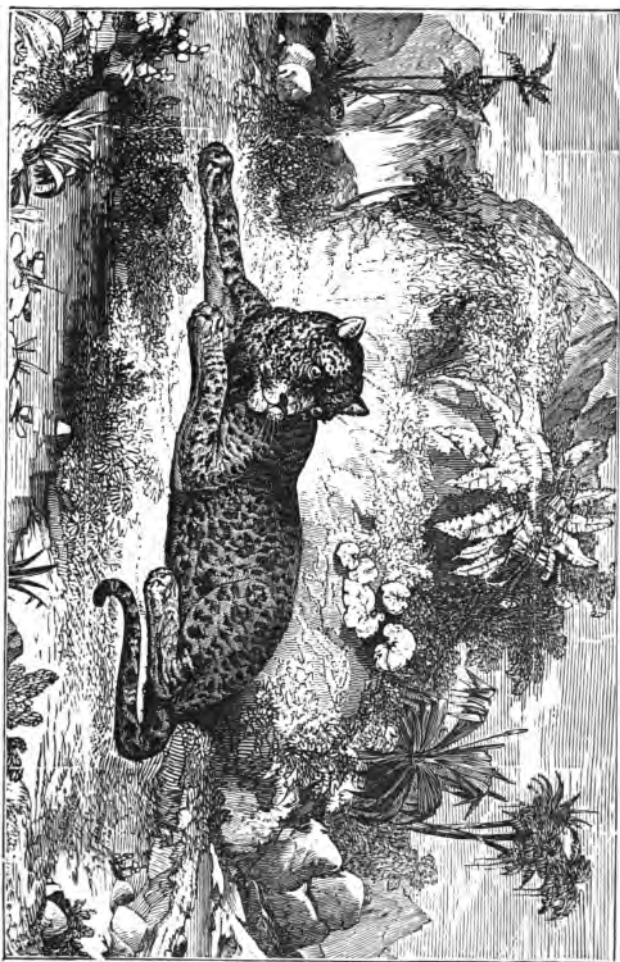


with feet dentated on the outer edge as in the Nilotic species. The travellers learned from the Indians that almost every year at San Fernando two or three persons were killed by them, and related the history of a young girl of Urituco, who by her coolness and courage escaped from death. Finding herself seized and carried into the water, she felt for the animal's eyes, and thrust her fingers into them. Stung with pain, the crocodile released its hold, after biting off the lower part of her left arm. She then reached the shore by swimming with her right hand, though faint with loss of blood.

The crocodile moves slowly, even sluggishly, when not excited ; but with great swiftness and abruptness when in quest of a victim. In running, it makes a rustling noise, proceeding apparently from its scales, and appears higher on its legs than when at rest, at the same time bending its back. It generally advances in a straight line, but can turn easily when it pleases. Even against the strongest current it can swim with ease and power. On the Apure its principal food seems to be the cavies, which are found in great numbers on the river-banks. These animals, which are about the size of the common pig, have no defensive weapons,

and are equally persecuted by the jaguar on land and the crocodile in the water.

The voyage down the Apure offered many attractions for a man of scientific taste, yet it had both its inconveniences and its dangers. Jaguars, tapirs, peccaries often beset the boat; and almost as in the primeval world, panthers, hoccas, and crocodiles gazed unconcernedly on the voyagers. As they drifted down at night, they could hear the howl of beasts of prey in the forests, and the shrill cry of the parrot mingling with more savage sounds. On one occasion they saw an enormous jaguar outstretched beneath the shade of a large mimosa. He had just killed a cavy, which he clutched in one of his paws, while a crowd of vultures waited to banquet on the refuse. It was curious to notice the mingled timidity and boldness of these unclean birds: they would advance within two feet of the tiger, but at his slightest movement instantly retreated. To examine them more closely, Humboldt made for the shore; when "the tyrant of the forest" withdrew behind the sauso bushes, leaving his victim on the sand. The vultures immediately pounced upon it, but were put to flight by the "tiger" rushing in amongst them.



JAGUAR.



With incidents such as these marking every day, the voyagers rowed from the Apure into the broad lake-like channel of the Orinoco, which at this point, though nearly two hundred miles from its mouth, measured four leagues in breadth. They were then compelled to hire a vessel fitted for the navigation of the great river. It was of Indian build, and not particularly comfortable. In the stern a kind of cabin had been constructed for four persons, but was built so low, on account of the wind, that Humboldt and his companion were forced to lie stretched on hard tree-trunks, and to extend their legs beyond the roof, or to sit in a bent attitude to secure sufficient room. In front sat the naked Indians, two and two, keeping time to the beat of their paddles with monotonous and melancholy ditties. The little vessel was loaded also with the specimens of plants and animals collected by the travellers: these, with the instruments, were stowed in the centre; around them were slung the hammocks of the crew; while in an outer circle fires were kept lighted, to drive away the jaguars. The instruments at night shared the couch of Humboldt and his friend; and whenever they were required for use, the travellers were compelled to

land and unpack them. Add to all these *impedimenta*, the oppressive heat, and the troublesome mosquitoes, and the reader will conceive that the pursuit of scientific knowledge has its pains as well as its pleasures. To be sure, Humboldt was not the man to forego the latter from any dread of the former !

Continuing their course, they came in sight of the mountains of Encaramada, which descend in terraces to the bank of the river, and are inhabited by a tribe of peaceable Indians addicted to agriculture. They cherish a curious tradition, to the effect that, at the time of the Great Waters, when their fathers fled to their canoes to escape destruction, the ocean-waves washed the worn rocks of Encaramada. Ask the Tamanars how man contrived to survive this tremendous flood, and they reply, that one man and one woman saved themselves on a lofty mountain called Tamanacu, situated on the bank of the Asweru ; and that throwing behind them, over their heads, the fruits of the *Mauritia* palm, they saw these fruits spring up into human beings, who soon repeopled the earth. The reader will see in this tradition a version of the Greek myth of Pyrrha and Deucalion. Humboldt, referring to

the Noachian Deluge, remarks that hieroglyphic figures may frequently be found sculptured on the river-cliffs at a height inaccessible now except by mechanical means; and the natives, when asked how they could have been carved, answered with a smile, as relating a fact of which only a stranger could be ignorant, "That at the period of the Great Waters their fathers reached to that elevation in boats." The philosopher cannot but feel a strong deep interest in these old traditions of the human race, which are scattered over the surface of the globe like the fragments of a vast shipwreck. Like certain families of plants, says Humboldt, which, notwithstanding the diversities of climate and locality, retain the impress of a common type, the legends respecting the primitive state of the globe present among all nations a similarity that cannot be overlooked; and different languages, belonging to branches which have no apparent connection with one another, transmit to us the same remarkable facts. Everywhere we find a sameness in the substance of the myths and fables that relate to a great world-catastrophe and the renovation of humanity, though each nation gives to them a colouring of its own. In the great continents, as

in the smallest islands of the Pacific, it is always on the nearest and loftiest mountain that the remains of the human race were saved ; and the more uncultured the nations, the more recent does this event seem to have been, and the briefer the interval in which they have begun to acquire a knowledge of themselves.

In this connection the reader may be reminded of the remarkable Assyrian tablets discovered among the ruins of Nineveh by the late Mr. George Smith, which recorded a history of the Deluge, resembling, in its main particulars, the Mosaic narrative.

The voyagers, in the neighbourhood of Atures, had an opportunity of witnessing the Indian process of turtle-fishing and egg-collecting.

The arran, or tortuga, so much valued for its eggs, is a large fresh-water tortoise, with webbed feet, a very flat head, a deep groove between the eyes, and an upper shell composed of five central, eight lateral, and twenty-four marginal plates. Its colour on the upper part of the body is a dark gray ; on the lower, orange. When full grown, it weighs from forty to fifty pounds. The female lays a number of eggs, which are much larger than



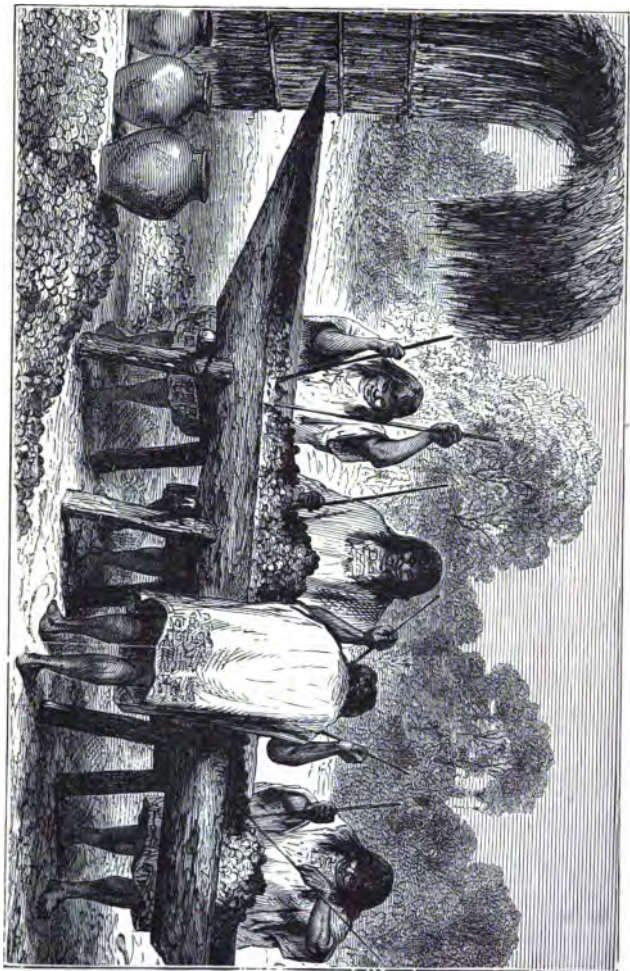
those of a pigeon, and coated with a calcareous substance. The tackay is another and a smaller species, of an olive-green colour. Its eggs are much esteemed, but are less numerous than those of the tortuga.

The latter deposits its eggs when the river is at its lowest. Early in February the turtle issue from the water, and for a great part of the day sun themselves on the open beach. At the beginning of March, they assemble on the islands where they breed, and thousands may then be seen arranged in files, like soldiers on parade. The Indians station sentinels at certain distances, to prevent them from being disturbed; and the canoes ascending or descending the river are ordered to keep in mid-stream. The work of egg-laying begins soon after sunset, and continues throughout the night. Each animal digs a hole in the sand, about three feet by two, using for the purpose its hind feet, which are very long and furnished with crooked claws. Their desire to rid themselves of their burden is so strong that the utmost confusion prevails, and many of the eggs are broken. Frequently, the turtle are overtaken by day before the task is finished; in which case they continue to

work assiduously, apparently undisturbed by the presence of the fishers.

In April the Indians assemble, under the superintendence of the Roman Catholic missionaries, who divide the "egg-ground" into equal allotments. The natives then remove the earth with their hands, collect the eggs, and carry them in baskets to the encampment, where they are placed in long troughs filled with water. They are next broken and stirred, and allowed to remain in the sunshine until the yolk, which swims on the surface, has coagulated, when it is taken off and boiled. The oil thus obtained is limpid, and without smell, and used for lamps as well as for cooking.

Entering the passage of the Baraguan, they found the river confined between enormous precipices of granite. They landed on an islet in the middle of the impetuous current, which they computed to measure a mile in breadth. They looked vainly for plants in the chinks and crevices of the rocks; but multitudes of lizards sunned themselves on the stones. The heat was oppressive; not a breath of wind stirred the air; an intense tranquillity pervaded the scene. How vivid, says Humboldt, is the impression which, in these torrid climates, the



MANUFACTURE OF TURTLE OIL



noontide calm of nature produces! The beasts of the forests retire to their thickets; the birds nestle among the foliage or in the fissures of the rocks. Yet, amid this apparent tranquillity, listen with intent ear, and you will detect a stifled sound, an incessant murmur, a hum of insects, prevailing in the lower regions of the atmosphere. Nothing can communicate to man a more potent idea of the extent and multitudinousness of organic life. Myriads of insects crawl on the ground, and flutter round the sun-stricken plants. Confused sounds issue from every bush, from the decayed trunks of trees, from the crevices of the rocks, and from the soil, which is undermined by lizards, millepedes, and blindworms. These swell into a voice which proclaims to man that Nature breathes; that under a thousand different forms, life is diffused in the cracked and blighted soil, as in the bosom of the pregnant waters and the depths of the prolific air.

In reference to an encampment of Indians which the travellers fell in with, Humboldt comments on the difficulty which is felt in recognizing in a people so dull, taciturn, and unimpassioned, the original character of our species. Human nature does not

here present itself in that beautiful simplicity of which the poets of every civilized nation have drawn such attractive pictures. The savage of the Orinoco is not less hideous than the savage of the Mississippi; and the philosopher, dreaming of the perfectibility of the human race, would fain persuade himself that these children of the soil, crouching round their fires, or seated on large shells of turtle, their bodies covered with earth and grease, and their eyes stolidly fixed for hours on the drink they are preparing for their further debasement, far from being the original type of humanity, are a degenerate race, the feeble remains of people which, after long wandering in the forests, have been again immersed in barbarism.

The ordinary decoration of the Orinoco Indians is—red paint! The commonest kind of pigment is called anotta, and is obtained from the seeds of the *Bixa Orellana*. Another and more expensive species is extracted from the leaves of the *Bignonia chica*; while a black ingredient from the *Genipa Americana* is called caruto. These pigments are mixed with grease and turtle-oil, and applied according to national custom or individual taste.

During his voyage up the river, Humboldt passed the mouth of several tributaries of the Orinoco, especially that of the Meta, which resembles the Danube in length, breadth, and volume; and arrived at the town of Atures, where the great river forms two magnificent falls. These are forty-one miles distant from each other, and are known to the natives by the names of Mapara and Quittuna, to the missionaries as Atures and Maypures. The chief peril in navigating these rapids arises neither from the tremendous velocity of the current, nor the projecting granite rocks, but from the natural rafts, composed of trees bound together by lianas and covered with aquatic plants, brought down by the rolling, rushing water. The cataracts are created by bars of granite stretching across the bed of the river, which here cleaves a path through the opposing mountains; but beyond these obstructions the course is again open to navigation for a distance of five hundred and seventy-six miles.

The scenery in the neighbourhood of the lower fall is described as beautiful exceedingly.

West of Atures rises, to the height of nearly 3200 feet, the isolated pyramidal mass of the Peak of Urriana. A rich and varied vegetation

covers the savannas with emerald tints of verdure. Here and there piles of gigantic blocks obtrude themselves; and the margins of the grassy plains slope down into deep valleys and ravines, which bloom with arums, heliconias, and lianas. The ledges of primary rocks, raised but slightly above the plain, are encrusted with lichens and mosses, and partially overhung with succulent plants, and the shining leaves of tufted evergreens. The horizon is everywhere bounded by mountains overgrown with forests of laurels, among which spring the slender graceful stems of palms a hundred feet high, their pillar-like trunks covered with feathery foliage. Eastward of Atures other mountains may be seen, the ridge of which is composed of pointed cliffs, rising like huge pillars above the trees. When these columnar masses are situated near the Orinoco, flamingoes, herons, and other wading birds, perch on their summits like so many sentinels. In the vicinity of the cataracts, the moisture diffused in the air produces a perennial verdure, and wherever soil is accumulated on the plains it is covered with beautiful vegetable life.

Over an extent of more than five miles, the bed of the Orinoco is traversed by numerous dikes of



granite, which form natural dams ; and the channel is filled with islands of every form, some steep and craggy, others low and flat, like shoals. These break up the river into torrents, which dash their spray perpetually against the rocks. All are enriched with sylvan vegetation, and seem like clusters of palm-trees surrounded by snowy foam. The current breaks up into a number of rapids, each endeavouring to force a passage through the rocky narrows ; and is everywhere engulfed in caves and hollows, which are filled with a perpetual roar.

In the neighbourhood of Atures, the jaguars, which everywhere infest the Orinoco forests, are so numerous and so audacious that they prowl in the precincts of the village, and feed upon the pigs of the poor Indians. Humboldt heard the following curious anecdote from one of the missionaries :—

“Two Indian children, a boy and girl eight or nine years of age, were sitting among the grass near the village of Atures, in the midst of a savanna. About two in the afternoon a jaguar issued from the forest, and approached the children, gambolling around them ; sometimes concealing itself among the tall thick grass, and again bounding forward,

with curved back and head lowered, like a cat. The little boy was ignorant of the danger which threatened him, and became aware of it only when the jaguar dealt him a blow on the head with one of its paws. The blows thus inflicted were slight at first, but gradually increased in force. The jaguar's claws wounded the child, and blood flowed copiously. The little girl, seizing a branch of a tree, struck the animal, which retreated before her; and on the coming up of some Indians, attracted by the cries of the children, bounded away into the forest."

We come now to the upper fall, or cataract of Maypures. It is formed by a group of islands, which fill the river-bed to the length of three miles and a half, and by ridges of rock which occasionally connect them. To obtain a full view of the gorgeous spectacle, Humboldt ascended the eminence of Manimi. From this elevated point is seen a sheet of pearl-white foam a mile in extent. Enormous rocky masses, of iron blackness, emerge from its depths,—some columnar like basaltic cliffs, others resembling spires, and ruined battlements, and towers. Their dark colouring affords a vivid contrast to the white radiance of the foam. Each rock, each islet blooms

with tufts of stately trees. From the base of these prominences, far as the eye can reach, is suspended over the river a dense mist, through which are reared erect the tops of majestic palms. At every hour of the day the scene is visible under a new aspect. Sometimes it is chequered with the long shadows of the mountainous isles and feathery palm-groves; sometimes the glow of the sunset is refracted in the humid cloud that hangs above the cataract, and luminous many-coloured arches bend, and break, and rise, and disappear.

After a sojourn of five days in this picturesque neighbourhood, Humboldt continued his journey to San Fernando de Atabapo, on the Cassiquiare, a stream which forms a water-way between the Orinoco and the Rio Negro. Here a new plan was adopted, on the recommendation of the prior in charge of the Atabapo mission; and the voyager determined first to sail up the Atabapo, and then follow the course of the Temi and the Tuanimi. Thus he found himself engaged among the scenes of a new country, and on the banks of a river whose name he had never before heard. He penetrated into wildernesses where man had scarcely

left a trace of his existence. It was as if he had been transported by some magic spell to the early ages of the world, when Earth was being gradually peopled, and was thus made a witness of the first formation of human societies. The natives whom he met in these savage shades knew no other worship than that of an unseen and undefinable Spirit of Nature.

On the 6th of May, Humboldt and Bonpland reached the Rio Negro, a little river famous for its meandering course. For thirty-six days they had been confined to a narrow and frail-built canoe, in which the rising of one of the voyagers from his seat, unless he first gave warning of his intention to the rowers, would have capsized the boat and imperilled the lives of all. Though he had suffered severely from insects, Humboldt had experienced no ill effects from the climate or from exposure to the night air and the burning sun. Therefore, when he arrived on the isthmus that separates the mighty Orinoco from the not less mighty Amazon, he could survey with pleasure the record of past dangers, and rejoice in the scientific discoveries which his courage and his persistency had accomplished.

The feelings with which he looked round upon the landscapes of Equatorial America he has thus described :—

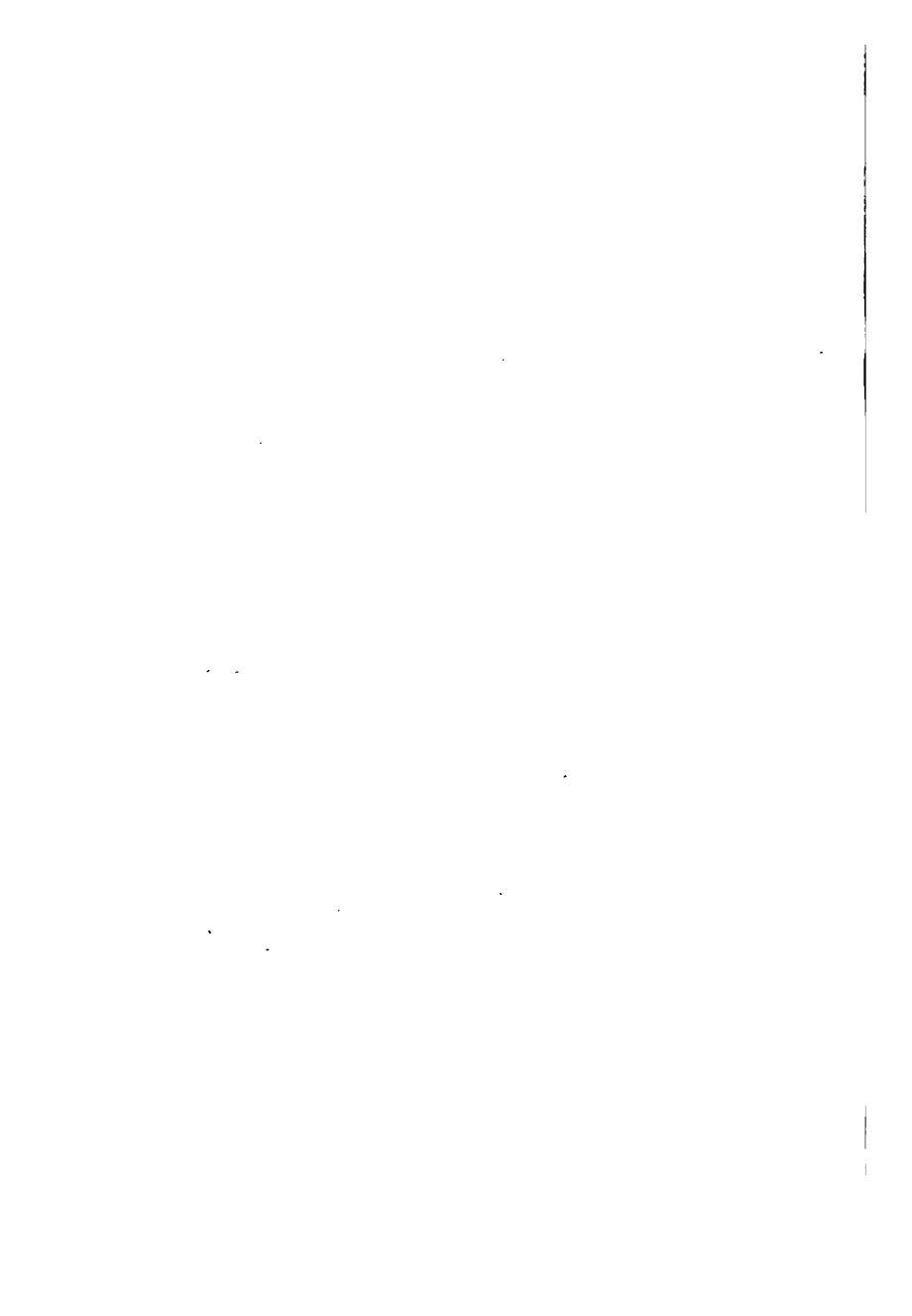
In these interior districts, he says, we grow accustomed to consider man as altogether of little importance in the order of Nature. The earth is thickly covered with a vigorous vegetation, the luxuriant growth of which no obstacle impedes. An immeasurably deep layer of black mould testifies to the continuous action of organic forces. Crocodiles and water-serpents lord it in the streams; jaguars, peccaries, tapirs, and monkeys, fearlessly roam the forests, which they inhabit as if it were an ancient inheritance. There is, however, something strange and depressing in such a scene of animated Nature, where man is nothing! It is not difficult to realize his littleness on the vast ocean or in the boundless deserts of Africa; though there, where nothing exists to remind us of our woods and leas and streams, the immensity of the desolation is less appalling. But here, in a fair, rich, and verdurous country, we seek in vain for signs of human life; we feel as if we were transported into an entirely new world.

In the Tropical plains, which do not rise, or rise

but little, above the sea-level, numerous species of pisang plants and of cycads and palmaceæ flourish ; a little higher, sheltered by the high valley-slopes, follow the spreading tree-ferns, with their glorious fronds ; and next, in exuberant vigour, come the cinchonas, constantly watered and refreshed by the cool cloud-mists, and yielding the highly valued Peruvian bark. If we leave the plains, and ascend the mountain solitudes, we meet with luxuriant groups of azaleas, thibaudias, and myrtle-leaved andromedas. A purple belt above them is formed by the resinous lufaria, the Alpine rose of the Cordilleras. Then, in the region of storms, the taller bushes and large-leaved plants entirely disappear ; and pencilled monocotyledons overspread the ground, which shines like a sea of gold. Here graze the alpaca and the llama, and the cattle introduced by the European conquerors of America. Where the naked trachytic rocks rise above the grassy plain, only plants of the lowest organization are found ;—such as the best of lichens, which derive a sparse nutriment from the atmosphere ; the parmelias, the lecideas, and the many-coloured leprarias. Islands of newly-fallen snow conceal the latest developments of vegetable life, until we reach the threshold of the region of



FELLING A CINCHONA.





eternal frost. The subterranean forces seek, with more or less success, to force their way through the snow-shrouded conical summits. When they succeed, however, it is not lava which they generally eject, like the volcanoes of the Old World, but boiling water or sulphurous vapour.

“When I indulge,” says Humboldt, “in personal recollections of grand or beautiful natural scenery, I think of the ocean, when in the calm of the tropical night the radiance of the stars sparkles in its mirror-like surface; or of the richly wooded valleys of the Cordilleras, where the stately palms emerge through the dark canopy of foliage, and stand as a gallery of pillars, a forest above a forest; or of the Peak of Teneriffe when the floating cloud-wreath separates its crest from the lower earth, and through a sudden gap torn in it by a rising current of air, the eye ranges from the brink of the crater to the vine-clad hills of Orotava, and the Hesperidean gardens of the coast. In these scenes lies the calm creative life of Nature, working silently: in them we see the individual character of the landscape,—a combination of the outlines of clouds, sea, and coast, in the virgin form of islands; beauty of vegetable forms as well as groupings.

For the irregular, the awful, even in Nature, everything which transcends our power of comprehension, becomes a source of enjoyment in a romantic prospect. Imagination has full scope for its creations in whatever cannot be perceived by the senses ; its influence differs with every change in the mood of the spectator. We erroneously conceive that we borrow from the outer world what in reality we ourselves put into it."

But in our desire to show the reader in what light and with what feelings Humboldt studied Nature, we have wandered far away from the desolate river-plains, where the great traveller stood between the mighty water-systems of the Orinoco and the Amazon. The Rio Negro, which, flowing eastward, connects the two, was long regarded by the Spanish Government as of political importance, from the means of communication with the missions of Guiana it would have opened up to the Portuguese. The political rivalries of the two nations, the geographical ignorance and the Babel-like confusion of tongues of the Indians, and the difficulty of inland travel, had long prevented the acquisition of any exact knowledge of the sources or tributaries

of the great American rivers. Now the main object of Humboldt's journey was to clear up the existing obscurity, and determine the course of that branch of the Orinoco which joins the dark-coloured waters of the Rio Negro.

Humboldt and Bonpland, re-embarking, descended the latter with considerable swiftness, passing the missions or stations of Marva, Terno, and Davipo. At the last named they purchased some fowls and a pig. The sight of the pig so whetted the appetites of their attendants, that they could not rest until they reached the island of Dapa, where it was to be roasted. Arriving there at sunset, they found an Indian hut, tenanted by fourteen persons, most of whom were lying naked in hammocks one above another, while four were seated round a fire, and roasting white ants, or termites, in a kind of paste. A couple of young women prepared some cassava cakes for the strangers, and the pig was duly cooked, served up, and devoured.

Proceeding onward, they passed the mouth of the Cassiquiare, which is the channel connecting the Rio Negro with the Orinoco ; and towards evening made a descent on Fort St. Carlos, situated about ten degrees north of the Equator. As the voyage

from the mouth of the Rio Negro to Grand Para occupies only twenty days, it was almost as expeditious for our voyagers to sail down the Amazon to the coast of Brazil,—as Wallace, and Bates, and Agassiz afterwards did,—as to return by the rivers Cassiquiare and Orinoco to that of Caracas. But being informed that it was difficult to pass from the Spanish to the Portuguese settlements, they decided on the former route.

Early on the 10th of May they embarked to ascend the Rio Negro. Threading the channel between the islands of Zaruma and Mibita, both of which are clothed with luxuriant vegetation, and breasting the rapids of the Piedra de Uinumane, they entered the Cassiquiare. At the mission of San Francisco Solano, on the river's left bank, they found two tribes of Indians represented, the Parimonales and Cheruvichahenas; and from the latter sought, but in vain, to procure some information respecting the head waters and sources of the Negro. In one of the huts of the former they bought a toucan and a macaw, to add to their already large stock of living specimens. Most of these were confined in small cages; others were allowed to move freely about the boat. At the approach of rain, the macaw

would raise the most frightful screams ; the toucan beat his bars in his anxiety to gain the shore and fish ; and the little monkeys took shelter in the large sleeves of the voyagers. At night, the leathern cases containing the provisions were stowed away in the centre ; round these were set the instruments and cages ; round these again were suspended the hammocks of the travellers ; and beyond them slept the Indians, protected against the attack of jaguars by a ring of fires.

On the 11th, after determining the geographical position of the mouth of the Cassiquiare as nearly lat.  $2^{\circ} 0' 42''$  N., and long.  $67^{\circ} 13' 26''$  W., they continued their ascent of the river against a very rapid current. Dire were their sufferings from the stings of the mosquitoes, which increased in numbers as the voyagers advanced. In the whole course of the river they did not meet in the Christian settlements with a population exceeding two hundred, and they observed that the free Indians had sought a pleasanter neighbourhood. The few natives lived upon ants for a great part of the year, and relished them as keenly as the New Zealanders once relished their spiders. At one of the miserable Christian settlements they found a monk who had resided

there for twenty years, and whose legs were so spotted by insect stings that their original colour was not to be detected. He gave a deplorable account of the cannibal propensities of his Indian neighbours. A few years before, an alcalde or overseer had eaten his wife, after putting her for some time on a fattening diet! The perversity of this Indian tribe, he said, was indescribable. New comers were received into the village who appeared to be good, mild, and industrious; but if they were once suffered to leave it, they could with difficulty be prevented from murdering all they met, and concealing some portions of the dead bodies to furnish out a hideous repast. In Humboldt's canoe was a fugitive Indian from Guiana, who in a few weeks had acquired some small degree of civilization. Owing to his intelligence and mildness of demeanour the travellers thought of engaging him in their service, but abandoned the idea on discovering that he was a cannibal. He would say, with signs and gestures of dreadful satisfaction, that his kinsmen,—that is, the people of his tribe,—preferred the inside of the hands in man, as in bears!

The Cassiquiare valley is noted for its fertility, and needs only cultivation to develop its extensive



TERMITES AND THEIR DWELLINGS.





resources. Cotton, sugar, rice, beans, indigo, all yield abundantly, when planted; but the planter is deterred from settling there by the dampness of the air and the extent to which it is infested by insects. It suffers terribly from the invasions of hosts of termites, or white ants, which destroy anything and everything they meet with. If a missionary seek to grow a little salad or any culinary vegetable, he is forced to fill an old canoe with soil, and to suspend it on posts, and in this "hanging garden" to sow his seeds.

Continuing their ascent of the Cassiquiare, which measured twelve hundred and eighty feet in breadth, the voyagers passed between "two enormous walls of trees hung with lianas." They could detect no gaps or openings in these leafy ramparts; and at night when they landed, the Indians had to clear with their hatchets a little space for their encampment. At the same time, it was difficult to obtain fuel for their fire, the wood being so full of sap that it would not burn. This mattered little, however, as the screen of arums, pothoses, and lianas furnished a most effectual shelter from the heavy rains.

On the 21st of May, our adventurers, after pass-

ing through leagues of country previously almost unknown to Europeans, again reached the broad channel of the Orinoco, about three miles below the station Esmeralda. The scenery at this junction of the waters is of a truly magnificent character; the mountains which form the northern bank of the Orinoco rising to a height of seven thousand eight hundred feet. The principal summit is called Duida, and at its foot, surrounded by clusters of *Mauritia* palms and pine-apple trees, and within hearing of the melodious waters which fall from the rocky ledges and wind their way into the great river, is situated the village already mentioned.

In Humboldt's time it was celebrated for the manufacture of the curare, a notorious poison, rivalling in deadliness the *ticunas* poison of the Amazon, and the *upas* juice of Java. It is used both in war and the chase,—and, strange to say, in stomach complaints! Our travellers had an opportunity of examining into its mode of preparation. Most of the Indians, when they arrived, had just returned from an excursion into the forest to gather the nuts of the *bertholletia* and the liana which yield the curare. They celebrated their return by a festival of several days' duration,—a festival,

that is, of the most degrading intoxication. The one amongst them who retained a little sensibility, who was the genius of the place and loudly boasted his skill, set to work to prepare the poison. The liana which yields it is of the *Strychnos* family. Its branches are scraped with a knife, and the bark by hard pounding is reduced to thin filaments. On this fibrous substance is poured cold water, through a kind of funnel made of a plantain leaf. The yellowish infusion which results is afterwards submitted to evaporation in a large earthen pot, and made into a paste with a glutinous vegetable juice obtained from a tree named the *kiracaguera*. When this juice is added to the curare, the whole is placed over a fire, until it boils; after which it coagulates into a thick black syrup, closely resembling tar. There is no risk in tasting it; it acts as a poison only when introduced into the blood. The Indians when hunting steep the tips of their arrows in it; and domestic fowls are usually killed by scratching the skin with one of these envenomed weapons. Fuller particulars of this vegetable poison were afterwards obtained by Sir Richard Schomburgk, during his travels in Equatorial America.

At Esmeralda, Humboldt saw some of the dwarf and fair-complexioned Indians, of whom in ancient traditions we read as living near the sources of the Orinoco. The Guaicas, or dwarfs, measured, on an average, from four feet ten and a half inches to four feet eleven and a half inches in height. The Guahariboes resembled the others in form and features, but their skin was of a lighter tint.

Humboldt and Bonpland left Esmeralda on the 23rd of May. The plague of insects, insufficient and indifferent food, and long confinement in a damp and narrow boat, had reduced them to a very feeble condition, but had not quenched the spirit of enterprise. As the country beyond Esmeralda was inhabited by hostile Indians, they had made no attempt to reach the head waters of the Orinoco, and had contented themselves with solving the geographical problem of its communication with the Rio Negro. They set out in stormy weather; but the thunder which rolled around the Duida peak did not interrupt the tranquillity of the plains. After a voyage of four hours they once more reached the point at which the Cassiquiare effects its junction with the Orinoco; and in the course of three or

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four days again presented themselves at the station of San Fernando de Atabapo.

Thence they continued to retrace their former route, passing the great rapids which we have already described. On the 31st they landed at the Puerto de la Expedicion, and proceeded to explore the cave of Ataruipe, where lies the dust of an extinct people. This visit was so interesting that we venture to place Humboldt's description of it before the reader, unabridged :—

#### THE CAVE OF ATARUIPE.

Not without difficulty and not without danger, says Humboldt, we climbed a steep and barren rock of granite. It would have been almost impossible to plant the foot on its smooth and highly inclined surface, had not large crystals of felspar, which had resisted decomposition, projected from the rock, and supplied occasional support.

Scarcely had we gained the summit when we were struck with wonder at the extraordinary aspect which the surrounding country presented : the foamy surface of the wide waters was studded with an archipelago of palm-fringed islands. Westward, from the left bank of the Orinoco, spread the

savannas of the Meta and the Cusanare, like a sea of verdure, the misty horizon of which glowed purple and gold in the radiance of the sunset. The glorious orb, like a globe of fire suspended over the seemingly boundless plain, and the lone peak of Uniana, the height of which was apparently increased by the vapours that wrapped it round about and softened its outlines, contributed to invest the scene with a character of peculiar sublimity.

We looked down into a deep valley enclosed on every side, in the shades of which fluttered birds of prey and goatsuckers. It was pleasant to watch their fleeting shadows, as they glided slowly along the rocky declivities.

A narrow ridge led us towards a neighbouring mountain, which supported enormous blocks of granite on its rounded summit. They measured upwards of forty and fifty feet in diameter, and were of so perfectly spherical a form that, as they seemed to touch the ground only at a few points, it might be supposed that the least oscillation would roll them into the abyss.

The remotest portion of the valley is clothed with shaggy forest and it is in this shady, lonesome spot,

on the declivity of a steep mountain, that the cavern of Ataruipe opens. It is less a cavern, however, than a jutting rock, in which the waters have excavated a vast hollow in long-past days when they rose to that elevation. In this sepulchre, or cemetery, of an extinct tribe, we soon counted nearly six hundred skeletons, all in good preservation, and all arranged in excellent order. Each skeleton reposes in a kind of basket, made of the leaf-stalks of the palm-tree, and square in form. The size is proportioned to the age of the dead; there are some for infants prematurely born. We saw them, says Humboldt, from ten to forty inches in length, the skeletons in them being bent together, but in no way injured,—not a rib, nor a phalanx, being wanting. The bones have been prepared in three different ways: either bleached in the air and sun; dyed red with anotta, a colouring matter obtained from the *Bixa orellana*; or, like real mummies, varnished with fragrant resins, and wrapped in leaves of the heliconia or of the plantain-tree. The Indians stated that the dead body is first placed in damp ground, so that the flesh may gradually be consumed; after some months it is exhumed, and the flesh still adhering to the bones

is scraped off with sharp stones. Several tribes in Guiana even now observe this custom.

Near the baskets, or *maporis*, as the Indians call them, are found half-baked earthen urns, which appear to contain the bones of the same family. The largest of them are three feet high, and five and a half feet in length. Their colour is greenish gray; and their oval form agreeable to the eye. The handles are shaped like crocodiles, or serpents; the rim is bordered with ornamental combinations of straight lines. Such paintings, continues Humboldt, are found in every zone, among nations the most remote from one another, either as regards the spot which they occupy on the globe, or the degree of civilization which they have attained. The inhabitants of Maypures still execute them on their commonest pottery; they decorate the bucklers of the Tahitians, the fishing implements of the Eskimos, the walls of the Mexican palace of Mitla, and the vases of ancient Greece.

We could not acquire any precise idea of the period to which the origin of the *maporis* and the painted vases contained in the rock-sepulchre of Atarupe can be traced. The greater part seemed not more than a century old; but it may be



supposed that, sheltered from all humidity, and in a uniform temperature, the preservation of these articles would be no less perfect if they dated from a more distant period.

Much to the concern of our guides we opened several *maporis*, in order to examine closely the form of the skulls. All presented the characteristics of the American race, except two or three which approached the Caucasian form. These may have belonged to *mestizos*, or half-breeds, who, deserting the stations of Meta and Apures, may have settled near the cataracts, and married women of the tribe of the Atures. We took several skulls, the skeleton of a child six or seven years old, and two of full-grown men, of the tribe of the Atures. All these bones, some painted red, some varnished with odoriferous resins, were placed in the baskets we have just described. They formed nearly a mule's load; and as we were aware of the superstitious aversion of the natives towards dead bodies, we carefully covered the baskets with new mats. Unfortunately for us, our precautions did not avail against the penetration of the Indians, and the extreme delicacy of their organs of smell. Wherever we stopped,—in the Carib mission-stations,


in the midst of the llanos, between Angostura and New Barcelona,—the natives assembled round our mules to admire the monsters which we had purchased at the Orinoco. These good people had scarcely touched our baggage when they predicted the approaching death of the beast of burden, “that carried the dead.” In vain we told them that they were deceived in their conjectures, that the panniers contained bones of crocodiles and lamantins; they persisted that they smelt the resin in which the skeletons were coated, and that they were their “old relations.” We were obliged to seek the interposition of the monks, in order to conquer the repugnance of the natives, and obtain for us a fresh relay of mules.

Silently we withdrew from the cave of Atarupe. It was one of those soft and tranquil nights which are so common in the Torrid Zone. The stars shone with a mild, clear radiance; their scintillation was scarcely discernible at the horizon, which seemed lighted up by the glorious nebulæ of the Southern hemisphere. Innumerable insect-swarms flashed a reddish lustre over the ground, which was densely clothed with vegetation, and shone with these living and moving fires as if it had been sown with the

stars of the firmament. On quitting the cavern, we paused several times to contemplate the singular beauty of the scene. Its mouth was enriched with the fragrant vanilla and festoons of bignonia; while above, on the summit of the acclivity, the palm trees waved their arrowy branches in serene air.

## CHAPTER IV.

### FURTHER ADVENTURES IN SOUTH AMERICA.

URING their sojourn at Atures, the Indians navigated the canoe of the adventurers through the great falls; and this accomplished, they once more embarked on the broad bosom of the Orinoco. Occasionally, as they passed the lower falls, they landed on the water-worn rocks, where the golden manakin (*Pipra rupicola*), one of the most beautiful birds of the Tropics, builds its nest. The randalite, or dike, of Carucari consists of an accumulation of immense blocks of granite, piled together in such a manner as to form a series of caverns. One of these our voyagers entered to gather the confervæ that thickly clothed the crevices and humid sides of the rock. Here they contemplated one of the most wonderful spectacles that had met their eyes on the banks of

the Orinoco. The great river rolled its seething waters over their heads! It seemed as if it were the sea hurtling against iron-bound cliffs; yet at the entrance of the cavern they could remain dry beneath the broad sheet of water which was hurled headlong in an arch from above the barrier. In other and deeper, but less spacious grottoes, the rock was worn through by the incessant aqueous action; and the voyagers saw columns of water, eight or nine inches broad, descending from the vaulted roof, to find an issue by clefts that seemed to communicate at great distances with each other.

Water above—water around—water below—water everywhere! This extraordinary prospect for some time interested Humboldt and his companion; but at last they were forced to contemplate it longer than they wished. Their boat was to skirt the eastern shore of a narrow island, and after a long circuit, to re-embark them. They passed an hour and a half vainly waiting for it. Night came on; and with it a terrible storm. The rain fell heavily. They began to fear that their frail canoe had been wrecked upon the rocks, and that the Indians, with characteristic selfishness, had quietly returned to the station. As they were only three

in number, soaked to the skin, and disquieted about the fate of their boat, the prospect of a long sleepless night, within hearing of the continuous cataract-roar, was far from agreeable. "M. Bonpland," writes Humboldt, "resolved to leave me on the island with our companion, Don Nicolas Sotto, and swim across the branches of the rivers that are separated by the granitic dikes. He hoped to reach the forest, and seek assistance at Atures from Father Zea. We dissuaded him with difficulty from undertaking this dangerous enterprise. He knew little of the labyrinth of small channels into which the Orinoco is divided. Most of them have strong whirlpools; and what passed before our eyes, while we were deliberating on our situation, proved sufficiently that the natives had deceived us respecting the absence of crocodiles in the cataracts. The little monkeys, which we had carried along with us for months, were deposited on the point of our island. Wet by the rains, and sensible of the slightest lowering of the temperature, these delicate animals sent forth plaintive cries, attracting to the spot a couple of crocodiles, the size and leaden colour of which denoted their great age. Their unexpected appearance made us reflect on the

danger we had incurred in bathing, on our first visit to the mission of Atures, in the middle of the *Randal*. After long waiting, the Indians at length arrived at the close of day. The natural cofferdam by which they had endeavoured to descend, in order to accomplish the circuit of the island, had become impassable, on account of the shallowness of the water. The pilot sought for a long time a more accessible passage in this labyrinth of rocks and islands. Happily our canoe was not damaged, and in less than half an hour our provisions, instruments, and animals were re-embarked."

Some days later our adventurers reached Uruana, which is picturesquely situated at the foot of a lofty granitic mountain, and among the shade of leafy trees. Here the river flows due east with a breadth of 12,789 feet, or nearly two miles and a half. The inhabitants of Uruana belong to a wild and uncivilized Indian tribe, and live almost entirely on hunting and fishing. They are unprepossessing in appearance, vindictive, and inordinately addicted to fermented liquors. They are of a robust constitution, notwithstanding their omnivorous appetites: "Nothing is so disgusting," say the Indians who are *not* Otomacs, "but that

an Otomac will eat it." Fish and turtle, however, are their favourite food, and the former they kill with remarkable dexterity by bow and arrow. When the fisheries fail,—that is, during the annual inundations,—the Otomacs devour an enormous quantity of earth. Humboldt found heaps of balls in their huts, piled up as our soldiers pile up cannon-shot, in pyramids three or four feet high. Each ball measures five or six inches in diameter, and is composed of a very fine unctuous clay, of a yellowish-gray colour; and being slightly baked in the fire, its outer colour, owing to the oxide of iron mingled with it, is a kind of rusty red.

This unctuous earth furnishes the principal sustenance of the Otomac when the river is high. But during the rest of the year he enjoys it as a dainty, and always mingles a little of it with his other food. It does not affect his health injuriously, as in the case of the earth-eating tribes of Africa, or the Javanese. With respect to the latter, we are told that the reddish and somewhat ferruginous clay which they eat occasionally has the effect of making them thin, and is taken for this purpose. But the Otomacs lose neither their plumpness nor their robustness.



We have referred to the Otomacs as fond of intoxicating liquors. But they are not only partial to palm wine, and the fermented juice of the cassava and maize; they indulge to excess in a violent stimulant, the powder of *nupa* or *niopo*. They gather the long pods of the acacia *niopo*, cut them into pieces, moisten them, and cause them to ferment. When the softened seeds begin to grow black, they are kneaded like a paste, mixed with some cassava flour and lime procured from the shell of a helix, and the mixture is then exposed to a very brisk fire, on a grate of hard wood. The hardened paste takes the form of small cakes, and when wanted for use is reduced to a fine powder, and placed on a dish five or six inches wide. The Otomac takes this dish in his right hand, and inhales the *niopo* by the nose, through a bird's forked bone, the two extremities of which are applied to the nostrils. So stimulating is the powder, that the smallest quantity induces violent sneezing in those unaccustomed to its use. It is said to madden the snuff-takers for some hours, and to render them furious in battle.

When the Otomacs have worked themselves by this means into a blood-fever, they kill one another

without any open exchange of blows. The more vindictive poison the nail of their thumb with curare; and the missionary at Uruana asserted that the mere indentation of this poisoned nail will cause death, if the curare be very active, and immediately mingle with the victim's blood. When after a night debauch a murder is committed, the guilty man makes haste to throw the dead body into the river. "Every time," said the missionary, "that I see the women fetch water from a part of the shore to which they are not accustomed to go for it, I at once suspect that a murder has been committed in my mission."

As a styptic—to stop bleeding—the Otomacs use a vegetable substance ("touchwood of ants") which is found in the valley of the Upper Orinoco. It is simply the material,—a yellowish-brown and very soft cottony fibre, from the leaves of a melastomacea, —which a species of emerald-green ant, the *formica spinacellis*, collects for its nest.

Leaving Uruana, the voyagers passed the island of Cucurupura, and, in due course, the mouth of the Apure. Continuing their course through a country which rapidly showed signs of superior cultivation

and a larger population, they passed the mouth of the Rio Caura, and clearing the whirlpools and rapids of the Boca del Inferno, safely arrived at Angostura, the capital of Guiana; having, in the space of seventy-five days, accomplished a voyage of five hundred leagues on the five great rivers, Apure, Orinoco, Atabapo, Negro, and Cassiquiare. It was with no small satisfaction they found themselves once more in the enjoyment of the comforts of civilized life. But the fatigues they had endured were soon forgotten, and they had scarcely reached the coast, the region inhabited by European colonists, before they entertained the idea of penetrating again into the wild and almost uninhabited interior.

They were compelled, however, to remain a month at Angostura through Bonpland's illness: he was seized with typhoid fever, the result probably of exposure in the damp climate of the Upper Orinoco. Happily the issue proved favourable, and Bonpland, being able to prescribe for himself, rapidly recovered his health.

The Orinoco at Angostura assumes almost the character of a sea-loch, and when it is high its waters inundate the quays, so that unwary individuals not unfrequently fall victims to the croco-

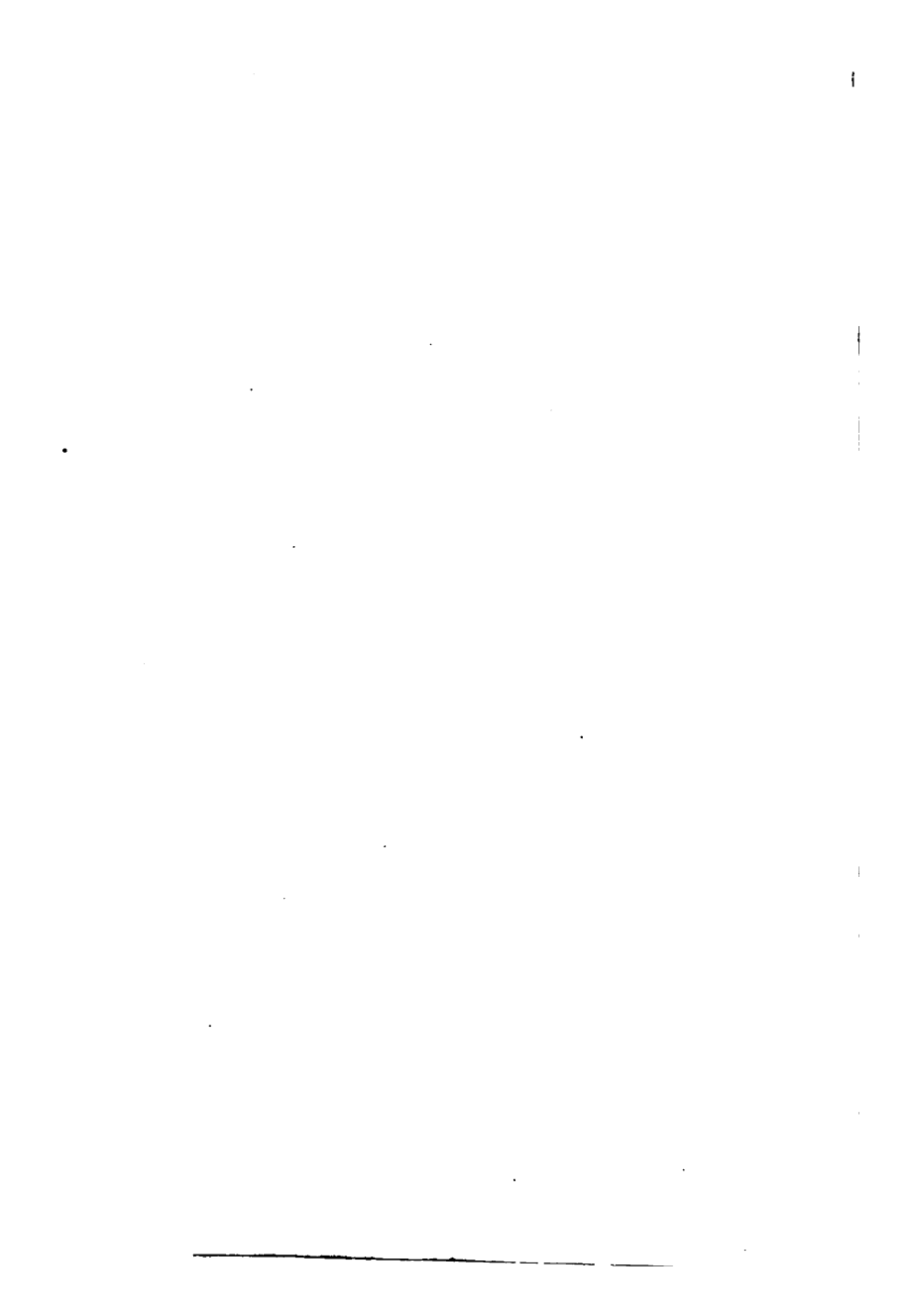
diles. While Humboldt resided there, an Indian, having gone to moor his canoe in a cave where the water was not three feet deep, was seized by a fierce crocodile, and carried off. With great presence of mind he searched for a knife in his pocket, but not finding it, thrust his fingers into the creature's eyes. The monster, however, would not relax its hold, but dived to the bottom of the river, and drowned its victim; after which it dragged the dead body to a neighbouring island.

It is said that the death-list from this cause every year is very great, especially in villages where the neighbouring lands are subject to inundation. The same crocodiles remain for a long time in the same localities, yearly growing more daring, especially, like the tiger, after they have once tasted human flesh. Their skin is so tough and thick that it is not easy to kill them; the only vulnerable parts for spear or bullet being the throat and the unarmed part beneath the shoulder. The natives catch them with large iron hooks baited with flesh, and attached to a chain which is fastened round the trunk of a tree. After the animal has struggled a while, they despatch it with their lances.

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WOMAN SEIZED BY A CROCODILE.



The natives of the Orinoco valley have numerous tales to tell in illustration of the dangers to which they are exposed. They have studied the manners of the crocodile as carefully as a Spanish *torero* has studied the manners of the bull. They have attained to a knowledge of the animal's movements, its means of attack, and the degree of its audacity. And this knowledge they put in practice, when assailed, with that presence of mind and that resignation which characterize the Indians, the Zambos, and the copper-coloured peoples generally. In regions where Nature is so powerful and so terrible, man holds himself constantly prepared to defend his life. The young Indian girl who delivered herself from the jaws of a crocodile, remarked, "I knew he would release me if I thrust my finger into his eyes."

Angostura is situated about seventy-five miles from the mouths of the Orinoco, which form a delta of mud and swamp not unlike that of the Mississippi, or of the Amazon. They are at least eleven in number. Of these the principal is the Boca de Navios, where, on the right bank, the granitic rock emerges through the marshy soil.

The left or northern bank, however, is very low ; and at a distance can be distinguished only by its clumps of *Mauritia* palm. This is the sago-tree of the country : it yields the flour of which the yaruma bread is made, and is found everywhere along the Orinoco, even to its sources. In the season of inundations, these groups, with their leaves in the form of a fan, have all the appearance of a forest rising from the bosom of the waters.

The voyager, says Humboldt, in sailing along the delta-channels of the Orinoco at night, sees with surprise the tall crest of the palm-tree illumined by large fires. These are the dwelling-places of the Guaranis—the Tivitivas and Warawaties of Sir Walter Raleigh, whose fatal expedition up the Orinoco is matter of history—which hang suspended from the trunks of trees. They fill mats with earth, attach them to the branches, and kindle on a layer of moist clay the fire necessary for their household wants. For ages they have owed their freedom to the quaking and swampy soil, which they alone know how to tread with security, going to and from their leafy abodes in the solitudes of the delta of the Orinoco. The *Mauritia* palm, “the





MAURITIA PALMS.



tree of life" of the missionaries, not only provides them with secure habitations during the floods of the Orinoco ; but its shelly fruit, its farinaceous pith, its saccharine juice, and the fibres of its leaf-stalks furnish them with food, wine, and the thread of which they weave their cordage and hammocks.

In the early days of maritime enterprise, when the minds of men were inflamed by the discoveries of Columbus and the conquests of Pizarro and Cortes, many expeditions were directed to the lower valley of this great river in quest of a supposed land of gold, *El Dorado*, fabulous rumours of the existence of which had reached Europe. Strange were the stories told of the Empire of the Grand Paliti, of the great city of Manoa, the palaces of which, covered with plates of massy gold, were reflected in the shining waters of the White Sea, or Laguna Parimes. The expeditions chiefly remembered, and which served to spread most effectually the legend of the riches of the Manoa, the Ouraguas, and the Guaypes, as well as of the existence of the Lakes of Gold and the City of the Gilded King, were made to the south of the rivers Guaviare, Fragua, and Cayueta. Orellana, the discoverer of

the Orinoco,\* having found idols of solid gold, had fixed the attention of the adventurous on an auriferous land between the Guaviare and the Papamene. Among these we may mention Jorge de Espiru, Hernan de Quesada, and Filipe de Uru, in 1536, 1542, and 1545. They were followed by Sir Walter Raleigh in 1595, who, like his predecessors, was deceived by the glittering micaceous rocks of the Urucuano, the name of the Rio Parima, and the lake-like inundations of the tributaries of the Orinoco. The natives, to free themselves from the presence of such daring intruders, continually described Dorado as easy to be reached, but placed it further and further inland as the adventurers progressed. It was like a phantom that seemed to fly before their advance, and yet beckoned them on unceasingly. It is in the nature of restless and wandering humanity to figure to itself happiness beyond the regions with which it is acquainted. El Dorado, like Atlas and the blossoming isles of the Hesperides, gradually disappeared from the domain of geography, and passed into that of mythological fictions. The brave men

\* This honour is generally attributed to him; but both Diego de Orelas, in 1531, and Alonso de Herrera, in 1538, explored a portion of the banks of the Lower Orinoco.

who sought it were disappointed in their object, but they contributed greatly to our knowledge of the American interior.

Of Sir Walter Raleigh's four expeditions (1595 to 1617), we may remark that in none of them did he penetrate more than two hundred miles inland ; but his narrative contains important materials for the history of geography. That he was singularly credulous for so sagacious a man must be admitted ; but he lived in an age of wonders, when the imagination was fired by the stories of new lands and new waters constantly revealing themselves to human enterprise. He was unquestionably self-deceived ; but it is not impossible that his descriptions gained something of exaggeration from a lively fancy, and from a desire to win the ear of Elizabeth. Half with pity, half with interest, we read of the transports shown by the American Indians at the sight of the great queen's picture ; his assertion that at the period when the Spaniards overthrew the throne of Cuzco, an ancient prophecy was found to the effect that the dynasty of the Incas would one day owe its restoration to Great Britain ; and his advice, that on pretext of defending the territory against external enemies, garrisons

of three or four thousand English soldiers should be placed in the towns of the Inca, obliging this prince to pay a contribution annually to Queen Elizabeth of £300,000 sterling. "It seemeth to me," he adds, "that this Empire of Guiana is reserved for the English nation."

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## CHAPTER V.

### CHILI, PERU, AND MEXICO.



THE last Humboldt and his friend took their leave of Angostura, and began their journey across the llanos of Venezuela, with the view of proceeding to Cumana, whence they might sail to Cuba and Mexico. There they proposed to remain a year, and then embark on board the galleon from Acapulco to Manilla.

We shall take up the great traveller's narrative on his departure from Cuba for Carthagena. Stormy weather compelled their bark to seek shelter in the Rio Seriu. Here Humboldt and Bonpland disembarked, and repaired to the village of Zapote, which was filled with coloured seamen, who had descended the Rio Seriu in their flat-bottomed boats, to convey bananas, maize, and poultry to the markets of Carthagena. Leaving the shore, which was covered

with mangroves, they struck into a forest remarkable for its great variety of palms. They particularly noticed the *Eleis melanococca*, which is only six feet four inches high; but its spathes contain upwards of 200,000 flowers. The kernels of the fruit are peeled in water, and the oily layer that rises from them, after being purified by boiling, yields the *manteca de corozo*, which is used for lighting churches and houses.

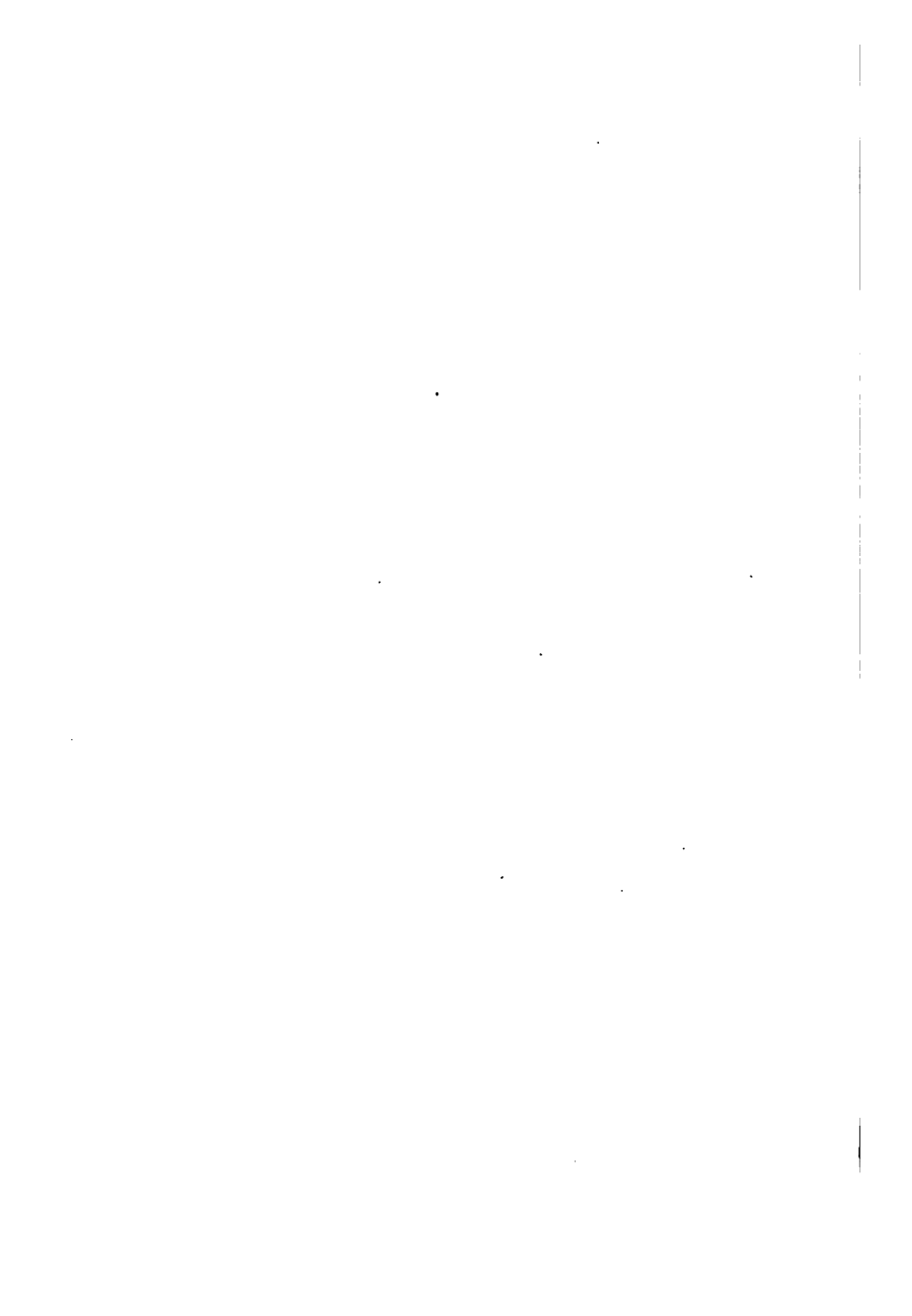
They found some of the natives engaged in collecting palm wine from the tree known to botanists as the *Cocos butyracea*. The trunk, which tapers but very slightly towards the summit, is first cut down; when an incision eighteen inches long, eight broad, and six deep, is made below the point at which the leaves and spathes come off. In the course of three days this cavity fills with a yellowish-white juice, of a sweet wine-like taste, which continues to flow for eighteen or twenty days. The last distillation is less sweet, but possessing a stronger alcoholic character, is more highly esteemed.

Re-embarking, the voyagers proceeded to Carthagena, a town which figures largely in the narratives of the sea-rovers of the olden time. Its port





VOLCANOES OF TURBACO.



or bay is nearly eleven and a half miles in length ; off the entrance lies the island of Tierra Bomba, nearly closing it up, except at two narrow channels at either extremity. One of these, the Boca Grande, was the scene of Admiral Vernon's successful attack in 1741.

Finding Cartagena unhealthy, Humboldt and his friend retired to the beautifully-situated Indian village of Turbaco, where they made their preparations for their contemplated expedition on the Rio Magdalena. The village is about eleven hundred and fifty feet above the sea ; and so abounds in snakes, that they hunt the rats even in the houses, and the bats on the roofs. The neighbouring forest attracted our travellers by the richness of its scenery, and the number of its gigantic trees. Among the latter may be particularized the *Cavanillesia platanifolia*, the large five-winged fruit of which hangs from the green bough-tips like paper-lanterns.

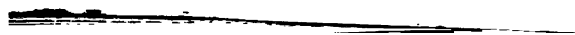
A remarkable feature of the district is the marshy tract known as Los Volcancitos. The Indian tradition runs, that the ground was once upon a time ignited, but that the conflagration was extinguished by a monk, who poured holy water copiously upon it, and converted the fire-volcano into mud-vol-

canoes. An open space, about nine hundred and eight feet square, is wholly free from vegetation, and consists on the surface of layers of clay of a dark-gray colour. In the middle rise the Volcancitos; that is, from fifteen to twenty small truncated cones, each about twenty to twenty-five feet high. The most elevated are on the southern side, and their circumference at the base measured from seventy-eight to eighty-five yards. The top of each terminated in an aperture from twenty-six to thirty inches in diameter, filled with water, through which air-bubbles forced a passage at the rate of about five explosions in two minutes. Each bubble contained from twelve to fourteen and a half cubic inches of elastic fluid; and such was their expansive power that they frequently hurled the water over the crater-rim. Some of the openings through which the air or gas escaped were situated on the level ground, and enclosed by a little barrier of mud from ten to fifteen inches high. It was observed that where these are nearly contiguous, the explosions did not occur simultaneously. Each crater apparently receives the gas by a different duct, and the various streams thus oppose an obstacle to the free passage of the aeriform fluid.

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FALLS OF TEQUENDAMA



Humboldt and Bonpland now embarked on a voyage up the Rio Magdalena, which traverses the beautiful and majestic valley of New Granada, and enters the sea by several mouths near Carthagena. They made their way as far as Honda, whence they proceeded on mules to the capital, Santa Fe de Bogota. Here they remained for several weeks, engaged in botanical and geological researches; and admiring the natural wonders of the rocks and waterfalls of Tequendama, the mines, and the picturesque remains of former earthquakes. By a difficult and dangerous mountain-pass, eleven thousand five hundred feet high, they crossed the Andes to Popayan; then visited the Carua valley, and the snow-crowned volcanoes of Puracé and Sotara; crossed the Equator, and arrived at Quito on the 6th of January 1802, after a journey of four months' duration.

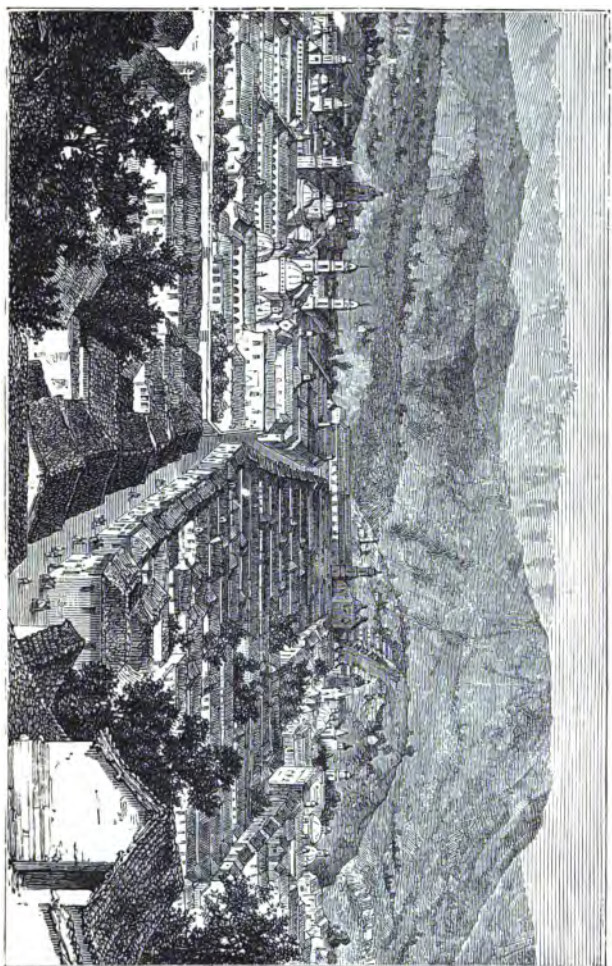
In the pleasant and equable climate of Quito Humboldt soon recovered his health and strength, and for nine months he made that city the headquarters of his geological and botanical expeditions; his love of natural beauty finding abundant gratification in the enchanting scenery surrounding it, and particularly in the constantly changing aspects of

the gigantic Andean peaks. After several unsuccessful efforts, he succeeded in reaching and examining the crater of the volcano Pichincha. He ascended to the snowy summits of the Antisana and the Cotopaxi, the latter the loftiest volcano of the Andes, the thunders of which are often heard at a distance of two hundred miles, at Honda, on the Magdalena. He also climbed, in company with Bonpland and Montufo, the lofty summit of Tunguragua; and crowned his enterprise by ascending Chimborazo to a height of eighteen thousand two hundred and ninety-six feet—a height to which no man before Humboldt had attained.

While at Quito he received information that Captain Baudin's expedition had sailed for New Holland by the Cape of Good Hope. He was compelled, therefore, to give up his idea of joining it; and after a careful and interesting exploration of the Andes, he and his friend set out in the direction of Lima.

First they directed their steps to the great river Amazon, visiting the ruins of Lactacunya, Hambato, and Riobamba, in a country which had been completely devastated by the terrible earthquakes of 1747. Then they proceeded to Loxa, where, in the





QUITO.



forests of Gouzanana and Malacates, they examined the trees which furnish the well-known Peruvian bark ; once highly valued, but now to a great extent superseded by quinine. Entering Peru by way of Ayavaca and Gouñcabamba, they crossed the lofty ridge of the Andes to descend to the river Amazon. They had thus an opportunity of inspecting the grand remains of the causeway of the Incas, which traversed the mountain-heights from Cuzco to Assouay, at an elevation above the sea varying from seven thousand six hundred and seventy to eleven thousand five hundred and ten feet. At Chamuza, a small village on a river of the same name, they hired a boat, and then went down to the Amazon as far as the cataracts of Rentama.

Returning to Peru, our undaunted travellers for the fifth time crossed the lofty chain of the Andes. In 7° south latitude they ascertained the position of the magnetic equator ; that is, the line in which the magnetic needle shows no inclination. They visited the productive mines of Hualguayok, where large masses of native silver are found at an elevation of twelve thousand seven hundred and ninety feet above the sea. These, with the mines of Pasco and Huantajayo, are the richest in Peru. Nor did they

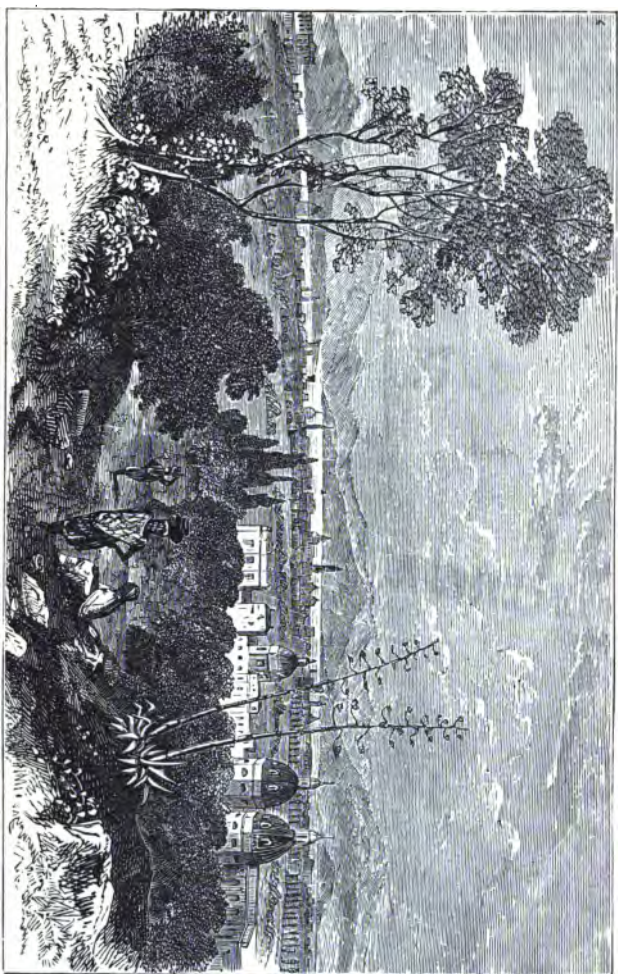
forget the hot springs of Caxamarca, and the ruins of the celebrated palace of the Inca Atahualpa. Their attention was also directed to the remains of the ancient city of Mansiche, with its pyramids, in one of which, in the eighteenth century, a large lump of pure gold, valued at four millions of French livres, was accidentally discovered. Descending the western Cordilleras of the Andes, Humboldt gazed for the first time on the shining waters of the Pacific Ocean, with feelings such as those "stout Cortez"\* felt, when he beheld the same glorious spectacle, standing,—

"Silent upon a peak in Darien."

At the same time Humboldt looked down into the long narrow littoral valley, where rain and thunder are unknown.

From Truxillo our travellers followed the arid coast of the Pacific to Lima, the capital of Peru, once famous for its opulence. There they remained for some months, carrying on valuable climatic and astronomical researches, and making an excursion to Callao to view the transit of Mercury. Nor must we omit to refer to the great philosopher's investi-

\* Keats, in his celebrated sonnet, says "Cortez;" but it was Nunez de Balboa who first saw the Pacific Ocean.



CITY OF MEXICO.



gation into the causes and direction of the cold Peruvian ocean current, which now, on our hydrographic charts, perpetuates his name.

In January 1803, the restless travellers, most indefatigable and daring of the pioneers of science, embarked for Guayaquil. But on the 6th, the air resounded with the roar of the volcano Cotopaxi, which had broken out into furious activity. Humboldt prepared to revisit the mountain, to examine into the volcanic phenomena; but circumstances prevented him from carrying out his design, and he set sail for Acapulco, in New Spain, a port which was once the centre of the commerce of the Pacific. At first, he intended to remain only a few months in Mexico, and then to return to Europe, because his instruments were the worse for wear, and he was unable to remedy their imperfections. But he was so delighted with the scenery and inhabitants of Mexico, that he was induced to remain until the middle of winter.

Our travellers now departed in the direction of Mexico, ascending slowly by the hot valleys of Mescala and Papagayo, where the streams are spanned by bridges made of the fruits of the *Crescentia pinnata*, fastened together by ropes of agave.

From these torrid regions they emerged on the cool breezy table-lands, three thousand eight hundred to four thousand five hundred feet above the sea, where oaks and cypresses, pines and tree ferns, and the cereals of Europe, flourish in the vigorous air. At Mexico, the city of Montezuma, they spent several weeks in the examination of its curiosities, museums, and antiquities, and in the study of the natural productions of the surrounding country. Then they pushed onward to the celebrated mines of Moran and Real del Monte, and to the magnificent cascade of Regla, which pours its waters into a gorge lined on either side by basaltic colonnades.

The rainy season set in ; but it could not deter our scientific heroes from journeying by Palzyuaro, which is situated on a large lake near the Pacific coast, to the plain of Malpais, one of the most remarkable scenes of volcanic activity in the New World.

This plain, which forms part of an elevated table-land, bounded by hills of trachyte, basalt, and volcanic tufa, is covered with small cones from six to ten feet in height. From the Spanish conquest down to the middle of the last century, the area in question had undergone no change, and at one point it was covered with plantations of sugar-cane and





VOLCANO OF JORULLO.



indigo ; when suddenly, in June 1759, subterranean noises alarmed the inhabitants; and these were followed by shocks of earthquake, continuing for about two months. Tranquillity, however, seemed to be re-established about the beginning of September ; but in the night of the 28th the subterranean sounds were heard once more. The Indians at once took refuge on the neighbouring mountains. It was well they did so, for over a space of three or four miles the ground rose up in the shape of a dome ; flames started up from innumerable chinks and crannies ; while fragments of incandescent rock were hurled to an immense height, and the earth-crust swelled and sank like a billowy sea.

Two streams, which had previously watered the plantations, flung their waters into the seething chasms. Thousands of small cones were erupted all over the agitated area ; and in the midst of these *hornitos* or ovens, as they are locally called, six great mounds, varying in elevation from thirteen hundred and twelve to sixteen hundred and forty feet, sprang up from a gulf which crossed the plain in a N.N.E. to S.S.W. direction. The most elevated of these is the volcano of Jorullo, which has never since ceased its activity.

On the occasion of Humboldt's visit, he was informed by the natives that the heat of the hornitos was not what it had formerly been; yet his thermometer rose to  $203^{\circ}$  when exposed to the aqueous vapour exhaled from the fissures. Dense smoke rose from every cone, and in many was heard a subterranean noise, indicating the apparent proximity of a boiling fluid. Two streams were then making their way over the argillaceous plain, and the travellers ascertained that their temperature stood at  $126^{\circ}9$ . They received from the Indians the names of two rivers which had disappeared; for in several parts of the Malpais torrents of water are heard rushing in a direction from east to west. In the opinion of Humboldt all this district is hollow,—a crust of earth, as it were, over a seething and raging mass of molten matter; but Sir Charles Lyell, with much greater probability, attributes the conical formation of the ground to the flow of lava over the original level of the plain.

Humboldt and Bonpland returned to Mexico over the fertile and well-wooded table-land of Toluca; and in January 1804 set out on a more extensive excursion, to survey the eastern side of the Mexican



HAVANNAH.



Cordilleras. In the course of this journey they determined, by trigonometrical measurements, the altitude of the great volcanoes Popocatepetl and Tztaccihuatl; also that of the pyramid of Cholula, built of bricks by the Tulteks in the days of a remote antiquity. They ascended and measured the summit of Cofre, which is nearly one thousand feet higher than the Peak of Teneriffe; and also the noble mass of Orizana. Then they proceeded to Vera Cruz, on the Bay of Mexico; happily escaped the yellow fever which was raging in the hot and arid plains; and embarked on board a Spanish frigate for the Cuban capital, rich and beautiful Havannah. After a sojourn of two months they took ship for the United States, reached Philadelphia, and paid a visit to Washington. Several happy weeks were spent in the study of American institutions, and in investigating the condition of the American population. Finally, the travellers returned to their native Europe, from which they had been absent for five years, and landed at Bordeaux in August 1804

## CHAPTER VI.

### TRAVELS IN SIBERIA.



THE German biographer of Humboldt, Professor Klencke, remarks that the memorable expedition, of which we have given a rapid summary in the preceding pages, produced a great sensation in Europe. It was not only unparalleled as the execution of a most magnificent enterprise by a private citizen, but it was entirely unselfish in its ends, and made wholly and absolutely in the interests of science. The world admired not alone the courageous resolution, the persistency of purpose, the industry, and the powers of investigation and criticism, which had been displayed; but as the results of the journey became understood, and their universal importance for all branches of science and commerce, nay, even for the political welfare of the regions he had traversed, it

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could not fail to appreciate both the traveller's generosity and his sagacity, and Humboldt was everywhere hailed as the *second Columbus*. Countries hitherto unknown, or of which the knowledge was imperfect, were brought before the intellectual survey of Europe in a succession of splendid landscapes. Not only were their exterior aspects described, but also their geological characteristics, their riches, and their necessities, with all that was most wonderful in their animal and vegetable life ; while from the mass of facts thus accumulated were developed and arranged the eternal laws of Nature.

On his return home, Humboldt immediately resumed the studies in which he so much delighted, and that intercourse with his friends and relatives which had been so long interrupted. In 1805, however, he was induced to visit Naples, as Vesuvius had been showing signs of abnormal activity, and he was a witness of the great eruption of the 12th of August. In 1806 and 1807 he was at Berlin. In 1808 we find him at Paris, publishing his beautiful descriptive book on the "Aspects of Nature," and preparing, with the assistance of his friend Bonpland, the record of their travels and adventures in Equatorial America.

He remained at Paris from 1808 until 1818, refusing the post of director of the department of Public Instruction in the newly established University of Berlin. In 1812 he received, with deep regret, the intelligence of the destruction, on the 26th of March, of the town of Caracas, where he and his friend had been so hospitably entertained. "Our friends," he writes, "are no more; the house which we have inhabited is a heap of dust; the town I have described has ceased to exist. The day was hot, the sky cloudless, the air calm; it was Maundy Thursday, and the people were mostly in their churches; nothing seemed to presage misfortune. Suddenly, at four o'clock in the afternoon, the bells, which were silent on this sacred day, began to toll; it was God's hand, no human agency, which rang out the death-knell. A shock of ten to twelve seconds' duration terrified the people; and the earth undulated like a boiling fluid. The danger was thought to have passed away, when suddenly the subterranean thunder was heard. The town was utterly destroyed. The nine thousand to ten thousand dead, of whom four to five thousand were buried beneath the falling churches, where a solemn procession was taking place, were the most

fortunate ; as they were suddenly and unexpectedly overtaken by death when partly engaged in devotion and prayer. But what shall we say of the unfortunate beings who, injured and wounded, survived their friends for months, and then perished for lack of attendance and nourishment? The following night was calm and clear; the moon shone; the tranquil heavens formed a strange contrast to the earth, covered with ruins and the bodies of the dead. Mothers carried the corpses of their children in their arms ; mourning families wandered through the town seeking a brother, a husband, or a friend, of whose fate they were ignorant."

In the year 1818, the year in which Humboldt left Paris, he parted with his old friend and faithful fellow-traveller, Bonpland. A word or two as to the latter's after career may interest the reader. After his return from America, he secured the esteem and affection of all with whom he came in contact, by the amiability of his character. As the Empress Josephine was passionately fond of flowers, Napoleon appointed the distinguished botanist superintendent of the Imperial Gardens at Malmaison, where a magnificent collection of botanic plants already existed. When the Empire fell before the

armed rush of all Europe, Bonpland determined on leaving France, and went to Buenos Ayres, in 1818, as professor of natural history. Nothing was heard of him for some years, and then painful intelligence reached his European friends. It appeared that, in 1820, he had proceeded into the interior of Paraguay, to visit an Indian colony which he had founded on the east bank of the river Parana. On arriving there, he was arrested by a company of soldiers, at the command of Dr. Francia, the then ruler of Paraguay, and carried to the town of St. Martha. There he was allowed to practise as a doctor; but it was not until 1829 that he obtained his liberty, and returned to Buenos Ayres.

After a visit to England, Humboldt once more took up his residence in the French capital, and resided there until summoned to accompany the King of Prussia on a journey to Italy in 1822. On this occasion he thrice ascended Mount Vesuvius for scientific purposes. Soon afterwards he removed to Berlin, as assiduous as ever in the acquisition of knowledge, and as keenly interested as ever in all that concerned the welfare of humanity. In 1828 he delivered a course of sixty-one lectures,

embodying the result of his researches into the physical history of the Earth, which furnished the outlines of the great work, entitled "Kosmos," that will always bear witness to the grasp of his intellect and the immensity of his acquisitions. That any one man should have gathered such vast and various knowledge, is truly wonderful; it is scarcely less wonderful that he should have been able to present its matured fruit to the world with so much lucidity of exposition and precision of detail.

These lectures, says his biographer, were new and remarkable, as regarded the position their author assumed towards the public. For while other learned men, whose social position is higher than that of the people, nearly all, in their scientific and academic pride, would not condescend to disseminate their knowledge among the masses, generally keeping their learning as the property and mystery of a caste, only to be interchanged with one another of the "experts;" Alexander von Humboldt, baron, court chamberlain, privy councillor, and confidential adviser of his King, thought it not derogatory to his rank and dignity to appear publicly as the teacher of his favourite sciences. He showed that a true

philosopher attaches himself to no exclusive class, but prefers the interests of knowledge and humanity to all considerations of birth, rank, or social position. And thus, actuated by the lofty impulses of his heart and mind, he fulfilled the noble duty which all the gifted of the earth owe to their fellow-men ; bestowing on them and instructing them out of the rich treasury of his knowledge and experience, and thereby doing something to raise them to his own level. The example set by Humboldt has since been followed, especially in England, by the most illustrious scholars and eminent *savants*.

But we must proceed to notice the more active portions of Humboldt's career. In 1829, at the invitation of the Emperor of Russia, who defrayed the entire cost, he undertook a tour of exploration in the Russian dominions in Asia, accompanied by Gustav Rose, an able mineralogist, and Ehrenberg, the well-known naturalist.

They embarked at Nishni-Novgorod, on the Volga, and arrived at Kasan on the 4th of June. Having visited and examined the Tartar ruins near Bolgari, the ancient capital of the Moguls, they proceeded to Jekatherinenburg, on the Asiatic side

of the Ural Mountains. Here Humboldt remained for four weeks, making important observations on the central and northern portion of this celebrated chain, which attains to a summit elevation of 4500 to 4800 feet. We find it also recorded that he examined the malachite pits of Zamtschepkoi, the remarkable magnetic mountain of Blagodad, and the rich deposits of topaz and barytes near Murznisk. Near Nishni-Tigilsk, he found a block of pure platinum weighing nearly twenty pounds. Having satisfied himself of the vast mineral resources of the Ural region, Humboldt crossed to Tobolsk on the Irtysh, and thence over the terrible steppe of Borabinska to Tura.

On the 2nd of August he arrived at Barnaul, on the bank of the Obi; whence he explored the picturesque Kolivan Lake, and the rich silver mines of the Schlangenberg, Riddersk, and Zyrianowski, lying on the south-west declivities of the Altai. The most elevated point of these masses, the mountain Bjelucha, the "God's Mountain" of the Cossacks, is about the same height as Mount Etna. From Riddersk, Humboldt and his companions directed their steps southward to the small fort of Ust-Komenoigorsk, and crossing Buchtorminsk, arrived

at the borders of the Chinese Dsanyarei. Receiving permission to cross the boundary line, he paid a brief but interesting visit to the Mogul settlement of Bate, also called Choni-maila-chu, where he entered on the real central district of Asia.

The return journey to Ust-Komenoigorsk was of great importance from a geological point of view : for as he sailed down the Irtish, he saw on its solitary and secluded banks, over a surface of upwards of sixteen thousand feet, immense rocks of granite, lying in horizontal courses on a formation of clay-slate ; a fact which greatly assisted Humboldt in his speculations on the origin of granite. From the little fortress already mentioned, he traversed the wild steppe of Ischim, which belongs to the central tribe of the nomadic Kirghiz, to the southern portion of the Ural chain ; he also crossed the line of the Cossacks of Ischim, and made his way to Mjask. This place afforded him a convenient starting-point for several interesting excursions. In a district of inconsiderable extent, and at a depth of only a few inches below the surface, he found three pieces of pure gold, of which two weighed about eighteen pounds each, and the third twenty-eight pounds. The course of the southern range of the Ural was



followed as far as Orsk. Here the green jasper quarries attracted and repaid attention.

Orenburg was the next stage in our adventurous philosopher's progress. It is a place of great trade, and the centre of the caravan routes which connect Asia with Europe. Humboldt here made the acquaintance of a certain Herr von Gurs, who had collected much curious information from the Tartars and others respecting the geography of Central Asia. He had learned, for instance, all about a high mountain, which had once been a volcano, and still disturbs the passing caravans by the storms of which it is the cause. The inhabitants endeavour to propitiate it by sacrifices of sheep. It was described as situated to the north-east of that great Balkash lake, which receives the waters of the river Sli.

Of the Kirghiz steppes, lying between the Don, the Volga, the Caspian, and the Chinese lake Dsaiseng, spreading over an extent of upwards of three thousand miles, Humboldt furnishes the following description :—

“These Asiatic Steppes,” he says, “which are sometimes hilly and sometimes interrupted by pine forests, possess, scattered over them in groups, a far

more varied vegetation than that of the llanos and pampas of Caracas and Buenos Ayres. The finest parts of these plains, which are inhabited by pastoral tribes, are adorned with low bushes of luxuriant white-blossomed rosaceæ, and enlivened with bright-coloured fritillarias, tulips, and cyripedias. As the Torrid Zone is characterized on the whole by the arborescent tendency of its vegetation; so some of the Asiatic Steppes in the Temperate Zone are distinguished by the great height of their flowering herbaceous plants. In traversing the trackless breadths of these immense plains, the traveller, seated in a low Tartar carriage, sees the densely-crowded plants bend beneath the wheels; but unless he stands erect, he cannot tell in what direction he is going. Some of the Asiatic Steppes are grassy plains; others are covered with succulent, evergreen, articulated soda-plants; others, again, shine in the distance with flakes of exuded salt, which besprinkle the clayey soil, resembling in appearance fresh-fallen snow."

We may add a few words respecting their inhabitants, the Kirghiz. These have been divided, from a remote antiquity, into the Great, Central,

and Little Hordes. To the former belong the lands north of the Ala-Tau, with portions of China and Tartary. The Central Horde, with which Humboldt became acquainted, inhabits the extensive area between the Ischim, the Irtish, Lake Balkash, and Khokand. The Little Horde wanders over the grassy levels between the river Yamba and the Ural Mountains.

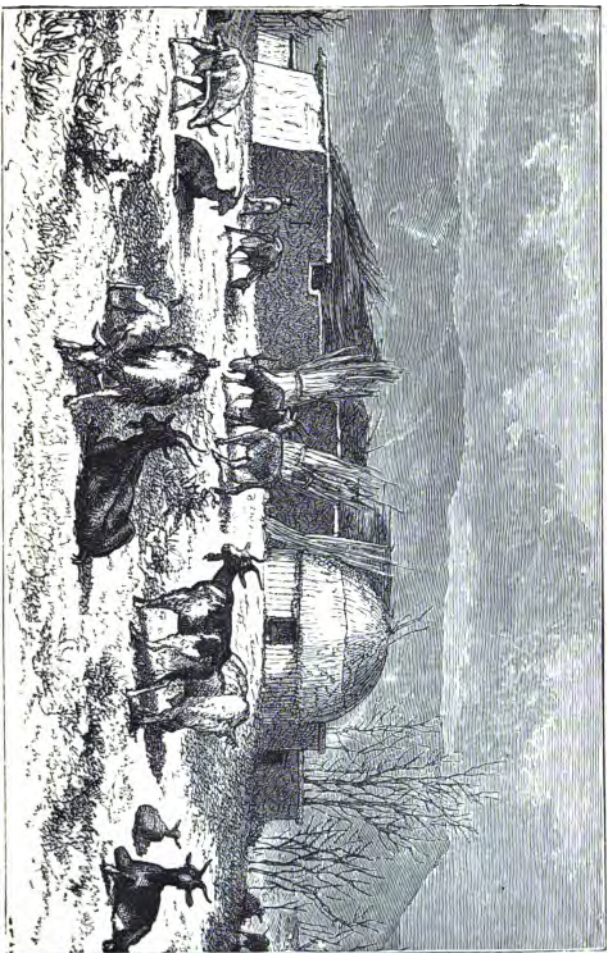
Mr. Atkinson, who has travelled much in Oriental and Western Siberia, describes as follows the *yourt*, or tent, constructed by the nomadic Kirghiz:—

“It is formed of willow trellis-work, put together with untanned strips of skin, and made into compartments which fold up. It is a circle of thirty-four feet in diameter, five feet high to the springing of the dome, and twelve feet in the centre. This dome is made of bent rods of willow, one and a quarter inch in diameter, put into the mortise-hole of a ring about four feet across, which secures the top of the dome, admits light, and lets out the smoke. The lower ends of the willow-rods are tied with leathern thongs to the top of the trellis-work at the sides, which renders it quite strong and secure. The whole is then covered with large sheets of *voilock*, made of wool and camel's hair,

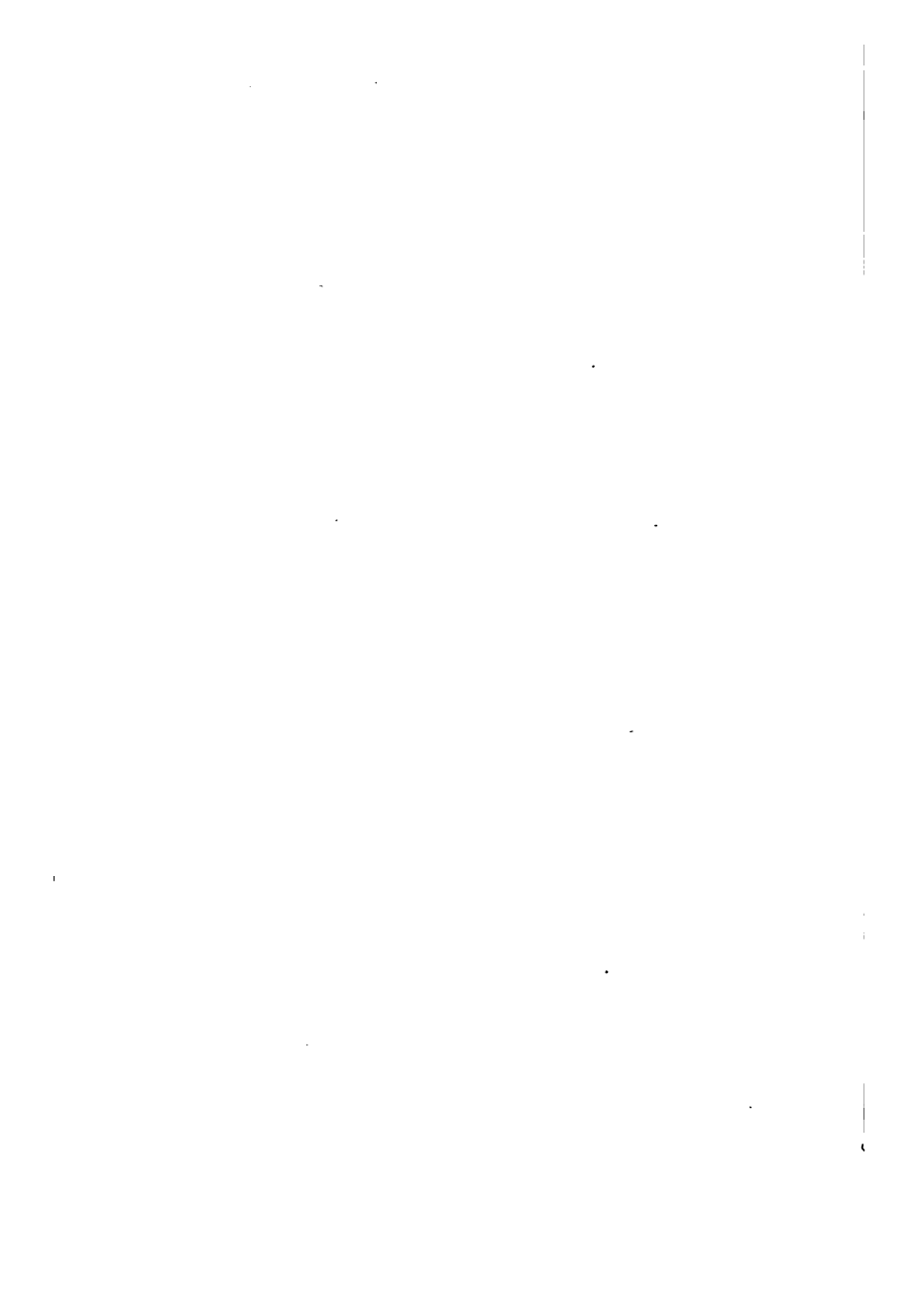
fitting close, making it water-tight and warm. A small aperture in the trellis-work forms a doorway, over which a piece of voilock hangs down and closes it ; but in the daytime this is rolled up and secured on the top of the yourt."

Mr. Atkinson goes on to say that the furniture and fittings of these dwellings are exceedingly simple ; the fire being made on the ground in the centre of the yourt, directly opposite to the door voilocks are spread out. Upon these stand sundry boxes, containing the different articles of clothing belonging to the household, pieces of Chinese silk, tea, dried fruits, and *ambas* or small squares of silver, each about two and a half inches long, one inch and a half broad, and about three-tenths of an inch thick. Some of the Kirghiz accumulate large quantities of these *ambas*, and carefully stow them away. Above these boxes are bales of Bokharian and Persian carpets, some of them of rare beauty and great value.

In another part of the yourt is kept the large sack of *koumis*, or mare's milk, completely covered up with voilock, to keep it warm and assist the fermentation. And close by stands a large leathern bottle, sometimes holding four gallons ; it is generally



KIRGHIZ WINTER DWELLING.



much ornamented, and so are the small bottles made for slinging from the nomad's saddle. A corner is reserved for the large iron caldron, and the trivet on which it is placed when any cooking is done within the *yourt*. There are usually half-a-dozen Chinese wooden bowls, and these are often beautifully painted and japanned. Some hold three pints, others more; the *koumis* is drunk out of them. When a stranger enters a Kirghiz *yourt* in summer, a Chinese bowl full of *koumis* is presented to him. It is considered rude to return the vessel before emptying it, and of such an impropriety a good Kirghiz is never guilty.

The saddles are placed on the bales of carpets; and as rich horse-trappings are greatly prized by the wealthy Kirghiz, many of them are both costly and handsome. If of Kirghiz workmanship, they are decorated with silver inlaid on iron, in chaste ornamental designs, and have velvet cushions; the bridles and other trappings are covered with small iron plates similarly inlaid.

Thongs of leather and ropes of camel-hair are hung up on the trellis-work; also saddle-cloths, and common saddles. Such is the *yourt* of a Kirghiz, and such is the manner in which it is furnished and adorned.

The distinctive costume of the Kirghiz is the *khalat*, a kind of large-sleeved pelisse, very long and very full, made of silk or cashmere, and of the most brilliant colours; but the poorer warriors substitute for this gorgeous dress a horse-skin jacket. Breeches fastened below the hips by a girdle of wool or cashmere, high-heeled madder-coloured boots, and a fox-skin cap, rising into a cone on the top, and lined inside with crimson cloth, complete the attire. For weapons the Kirghiz has his spear, his gun, his axe, and his cutlass. The women wear a long and ample robe, and a veil of numerous folds, surmounted by a lofty calico head-dress, a part of which falls over the shoulders and covers up the neck.

The Kirghiz as a race are crafty, fierce, and often cruel; but they rigidly perform the rites of hospitality, and the life of a guest is always held sacred. They do not hold his property, however, in so much respect, and are frequently unable to resist the temptation of plundering him of any article which has caught their fancy. Their favourite diversions are falconry and equestrian exercises. For the chase they cherish a passion: they love it for itself rather than for the game it secures, inasmuch as



their principal dainty is a dish of mutton. This simple viand they prepare in a very simple manner. They content themselves with skinning a sheep, cutting it up into quarters, and plunging it into a pot, where, for a couple of hours, it is kept boiling in a large quantity of water. Generally, to prevent the loss of any portion, they cook with the meat the animal's intestines, without even taking the trouble of cleaning them ! The guests arrange themselves in a circle on carpets of felt ; the men in the foremost rank, the women and children behind them. The smoking quarters of mutton are extracted from the pot ; each man draws his knife, slashes off a slice, eats a portion, and passes the remainder to his wife and children, who speedily finish it. The dogs come in for the bones. Afterwards, bowls of the liquor in which the meat has been boiled are handed round, and every Kirghiz smacks his lips over the greasy potion. Mutton-broth, koumis, and tea are his usual beverages. The tea is not made in the European fashion, but becomes a veritable soup, thickened with milk, flour, salt, and butter. In every decent household the women keep a vessel full of tea upon the fire, ready to offer it to any visitor, as the Turk offers coffee and the Spaniard chocolate.

But we must now return to our travellers

Having visited the celebrated rock-salt mines of Izelk, in the steppe of the tribe of the Little Horde, and the chief settlement of the Uralskian Cossacks, Humboldt proceeded to the German colonies on the Volga, at the large salt lake of Elton, and to the Moravian Brethren at Sarepta, on his way to Astrakhan, on the Caspian Sea, in the middle of October.

Having made a collection of specimens of fish from the Caspian, and analyzed its waters, this most indefatigable of travellers returned from Astrakhan to Moscow, crossing the isthmus which separates the rivers Don and Volga, traversing the territory of the Don Cossacks, and arriving in St. Petersburg on the 13th of November. Here he paid his homage to the Emperor, and furnished the imperial authorities with a record of the results of his observations; after which he hastened back to Berlin.

His absence had extended over a period of eight months and a half, from April the 12th to December the 28th, and in that time he had travelled a distance of nearly three thousand miles. But this was a task which meaner men might have accomplished; what distinguished Humboldt's journey

was the multiplicity of observations, as diversified as they were numerous, which he collected,—observations which proved of immense value in the extension of the science of physical geography. He also, during this journey, laid the foundations of climatology as it is now understood, and of his system of isothermic lines, which indicate those points of the globe where the mean annual temperature is the same.

We do not wish to weary our young readers with tedious details, but a few remarks on this subject may incite them to undertake an interesting study, and give them an idea of the usefulness of Humboldt's work. It was at one time believed that the coldness which in Europe increases towards the east was due to the elevation of its surface above the level of the sea. But this was found on actual experiment not to be the case. When Humboldt compared the warm winter temperature of Europe with that of Asia or America in the same latitude, he was forced from his own experience to reject the usual explanation given of this circumstance. He perceived that it was due not to the general configuration of this quarter of the globe so much as to its position, contiguous to a large hot

Asiatic zone of continent, which is much more heated by the constant influence of the sun's rays than is the ever-changing and "self-cooling ocean" which encircles the other parts of our globe, and diffuses its warm ascending atmosphere over the European plains. Hence the warm winter of the latter. Another and still more important cause is to be found (though, it is true, some authorities now deny it) in the Gulf Current of the Atlantic, which drives the heated waters of the American torrid zone to the north-east, and spreads warmth and fertility round the shores of Great Britain and Ireland. The west and south-west winds, moving in the same direction as this great ocean-current, pass over the northern districts of Europe as warm streams of air impregnated with the warm vapours of the sea. They mitigate the severity of winter; but as they gradually discharge their warm moisture they gradually cool, until they reach the Asiatic plains as dry, cold, dreary breezes. The west wind, therefore, which our poets extol for its geniality, chills and irritates the unfortunate inhabitants of the Asiatic steppes; and while Western Europe enjoys an insular coast climate, Eastern Europe has more of a continental climate, which involves a

great contrast between the winter cold and the summer heat.

On the southern boundary of Siberia the perpendicular rays of the constant sun necessarily generate heat, but with no other result than that an exceedingly warm summer succeeds to a very frigid winter. Humboldt says that he never met with grapes finer than those of Astrakhan, on the coast of the Caspian Sea ; and yet here, in winter, and still further south, at Kislar, which lies in the same latitude as sunny Avignon, the cold is almost equal to that of Polar lands ! It is recognized as a peculiarity of Siberia by Humboldt, this violent contrast between summer's heat and winter's cold : in the winter the vines must be buried deep in the earth, to protect them from frost ; while in summer, on account of the dry heat, they need to be artificially refreshed by water. As high as the 58th parallel of latitude, Humboldt could determine the mean temperature of a locality, with considerable accuracy, from the temperature of its springs. A little more to the north the ground remains constantly frozen to a depth of from twelve to fifteen feet, while in Norway, which is as near if not nearer to the North Pole, fresh moss and grass thrive beneath the snow, even in winter. Humboldt caused

a well to be dug in Bogoslawsk in the middle of winter, and at six feet below the surface came upon ice nine feet and a half in thickness! Yet such is the potency of the summer sun, that, in spite of these subterranean masses of ice, the upper crust is quickly thawed, and yields an abundant harvest.

These observations, with others which they suggested, combined to present to the mind of Humboldt some geological truths of importance. They enabled him to solve the previously abstruse problem, how the remains of animals, which by their organization belonged to a warm climate, as for example the mammoth, had been discovered embedded in the ice-blocks of these northern regions. It is not long since East Indian tigers were exhumed in Siberia in the same latitude as that of Hamburg and Berlin. Humboldt's conclusion is, that in hot summers these southern animals had wandered too far north; especially in former ages, when, owing to the greater volcanic activity of the then hotter earth, these northern regions also must have experienced a high temperature; that they had been suddenly overtaken by the winter, and buried in ice which has not melted since that time; and that river inundations,

flowing northward, may have carried them to the higher latitudes.

After Humboldt's return to Berlin, he began that vast and comprehensive work, which in itself would have been a sufficient monument of his industry, his energy, and his great intellectual powers. We refer to the "Kosmos;" a book of which it is difficult to give an idea to the young reader, from the variety and profundity of the subjects which it embraces. Physical geography, cosmography, the attractions of natural science, celestial phenomena, the form, density, and other characteristics of the Earth, hot springs, earthquakes, and volcanoes, mountain systems and their configuration, the terrestrial surface, the sea, the atmosphere, the distribution of heat, the geographical distribution of animal and vegetable life, and of the races of man;—all these topics are discussed with astonishing fulness, accuracy, copiousness of illustration, clearness of method, and freshness of style. It is not only scientific, but philosophical; not only ratiocinative, but descriptive; not only a book of thought, but a book of sentiment and sympathy.

We take as a specimen of its descriptive power

the following account of the Aurora Borealis, or Northern Lights :—

“Deep in the horizon, in the region where it is crossed by the magnetic meridian, the clear blue sky is suddenly obscured. An apparently dense fog bank is formed, which rises gradually to a height of eight or ten degrees. Its colour varies from brown to violet. The stars in this region of the firmament are visible, but as it were through a veil or curtain of smoke. A broad but intensely luminous arch of light, first white, then yellow, bounds the dark segment. But as this radiant arch rises subsequently to the smoky gray portion of the horizon, it is not merely a contrast with the brighter portion. In the extreme north, very near the magnetic pole, the obscure portion of the sky is less dark, and on some occasions is not seen at all.

“The shifting, coruscating arch of light sometimes remains for hours suspended in the horizon, before any rays or clusters of sparks separate from it, and shoot upward to the zenith. The more violent the discharges of the aurora borealis are, the more actively do the colours verge from violet and azure white, through every shade, to green and purple. Magnetic columns of fire spring from the luminous





AURORA BOREALIS.




arch, sometimes alone, and blended with black rays, like dense smoke ; sometimes they proceed simultaneously from opposite points of the horizon, and unite in a scintillating sea of fire, forming a gorgeous spectacle which no words can adequately describe, as its light-waves change and vary in form and colour every moment. The brilliancy of the phenomenon is increased by this motion. At last the rays unite in that point of the firmament which corresponds to the direction of the magnetic middle, forming what is known as the *corona*, or crown, of the aurora. This crown, however, is seldom perfect, and always immediately precedes the termination of the celestial display.

“The rays gradually grow shorter, rarer, and fainter of colour ; the crown and the luminous arch pass ‘like the baseless fabric of a vision ;’ and soon afterwards the sky is covered only by irregular groups of broad, pale, almost ashen-gray, immovable spots. These also vanish, before the trace of the dark smoke-like circle standing deep in the horizon is completely lost. At last nothing remains of the entire phenomenon but a thin white cloud, feathered at the edge, or separated into small round divisions.”

## CHAPTER VII.

### CONCLUSION.

HE high estimation in which Humboldt was held by his Sovereign appears from the fact that in 1830 he was selected to proceed to Paris to acknowledge King Louis-Philippe. In February 1831 he was again sent thither on a diplomatic mission. In 1835 he received a severe blow from the death of his beloved brother, and sought to stifle his grief by assiduously devoting himself to his old scientific pursuits. Scarcely a year elapsed in which he did not give to the world some proof of the activity and versatility of his intellect. The death of Frederick-William III., who had always distinguished him with special favour and his peculiar confidence, was very deeply felt; but the new King was not less sensible of his worth than his predecessor.

Some readers may doubt, as we do, whether Humboldt really gained in true dignity by his position at Court. We in England do not care to see our men of science or men of letters following in the train of royalty. We are proud of their independence. But there can be no question that it was grateful to Humboldt himself, and that he was scarcely less proud of being the confidential adviser of the Prussian King, than of standing at the head of all the scientific investigators of his time.

It is to be said in his praise, however, that he was far above all petty jealousies; that wherever ability manifested itself, he was foremost to aid and recognize it; regarding Science as his home, "he looked upon all within that enclosure as his children." As Miss Martineau acutely remarks, he strove for their welfare with a true paternal earnestness and indulgence. "Almost every man of science in Germany who has found his place, has been conducted to it by Humboldt; and this, not only by a good use of his influence at Court, but by business-like endeavour in other directions. Napoleon and Wellington were born in the same year with him. Wellington never showed more studious skill in the arrangement of his forces, nor Napoleon a more

efficient will in the distribution of the sceptres of European empires, than Humboldt, to the very last, in disposing of his forces, and conferring crowns in the interests of the kingdoms of the higher realms of Nature. He gloried in so long outliving the achievements of these great contemporaries: and truly it was a noble sight to see, so many years after the Great Captain had done his wars, and the Great Déspot had expiated his trespasses, the Monarch of Science still urging his conquests, and winning his victories, in a career which cost no tears to others, and left no place for repentance to himself."

Humboldt enjoyed a green old age. His strong frame seemed to defy Time, and his intellectual faculties preserved to the last their early vigour. He was spared to attain his ninetieth year, outliving all who had been his contemporaries,—soldier, poet, philosopher, and statesman. His conversational powers were remarkable. His memory did not fail him, and he could describe a scene from an Equatorial forest or reproduce a picture of a Siberian steppe, as freshly and as accurately as if he had but just witnessed it. Names and dates he recalled with the same exactness. In the street,

he was known to every resident of Berlin and Potsdam ; and strangers gazed upon the white-haired sage with delight, as he walked slowly and firmly, with his massive head bent a little forward, and his hand, behind his back, holding a pamphlet. He was, in truth, an intellectual giant, and the present generation cannot show his equal.

Alexander von Humboldt died on the 6th of May, 1859.

